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GOODWE API

API, short for Application Programming Interface, is a set of rules and protocols that allows different software applications to communicate with each other.

It enables developers to define the structure of their APIs in a standardized format using JSON or YAML. Key components of an API document include endpoints, operations (HTTPS methods like GET, POST), request and response schemas, parameters, headers, authentication methods, and more. It helps developers and teams collaborate efficiently by providing a clear, machine-readable interface description that can be used to generate API clients, server stubs, and interactive API documentation.

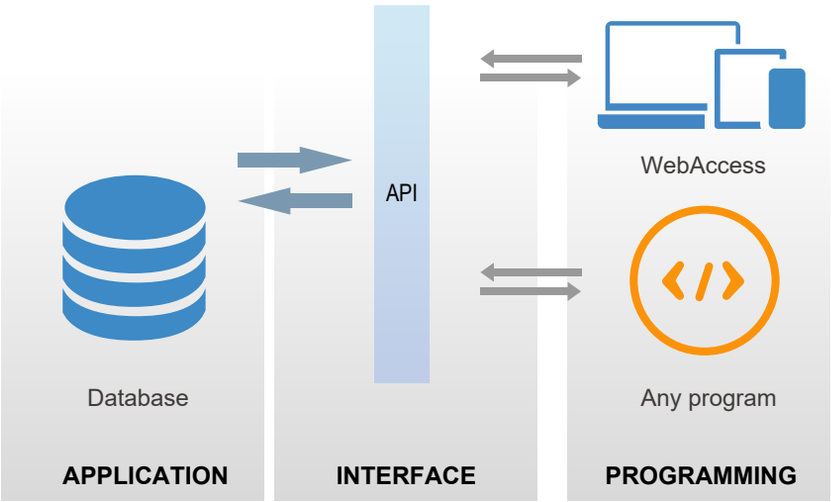

Figure 1- API logic diagram

GoodWe provides API services for data forwarding and batch remote control to our customers and third-parties. GOODWE offers API services through HTTPS protocols and KAFKA subscription method. There are three different types of APIs available for customers according to different application scenarios or requirements——OpenAPI, Real-time Data Monitoring API and Batch Remote Control Interface.

Functionally, the OpenAPI primarily focuses on business data processed by SEMS for customer calls, the Real-time Data Monitoring API focuses on forwarding raw device data directly to customers, and the Batch Remote Control Interface focuses on remote control functions.

Table 1- Application Scenarios Comparison between Three Interfaces

OpenAPI	Real-time Data Monitoring API	Batch Remote Control Interface
1.Own system integrated monitoring data	1.Customers want to build their own monitoring platform	1.For third party service suppliers
2.No further requirements for business data	2. Customers want to design business data according to their own business characteristics.	2.Third parties need batch remote control
3.No special requirements for timeliness	3.Requirements for timeliness	3.Third parties need batch query of authorized devices

OpenAPI

The OpenAPI is exclusively accessible to SEMS organization account users. This service provides users with comprehensive access to all devices within their local organization, facilitating both data retrieval and remote control capabilities. Additionally, the OpenAPI supports the retrieval of data from Datalogger, including weather station data, Datalogger data, and HomeKit data.

Using the HTTPS protocol, the OpenAPI enables customers to request data and control commands functions. The HTTPS protocol in APIs operates by enabling clients to send requests to servers using various methods (like GET, POST, PUT, DELETE), with the server responding with status codes and data based on the request's content and intent. The interfaces for accessing various data types are categorized into four main types: plant interface, device interface, remote control interface, and Datalogger interface. These interfaces are subject to specific calling frequency limits. The default frequency limit is 3600 calls per hour, If the access frequency exceeds the limit, an error warning will be returned.

Table 2- Main Functions of OpenAPI

Power plant information	Device Information	Remote control	Datalogger information
1.Power plant list	1.Device List	1.RTC, Safety Code, Backup	1.Environmental test data
2.Power plant information	2.Device details	2.Capacity, Charge, Discharge	2.Datalogger configuration information
3.Daily power generation	3.Daily power generation	3.Backup, PF, Active power	3.Datalogger data
4.Daily, monthly and annual power generation	4.Daily, monthly and annual power generation	4.Battery, Export power limit, Max feed power, EMS	4.Homekit data

Real-time Data Monitoring API

The Real-time Data Monitoring API, which uses the HTTPS protocol, is accessible to third-party suppliers. These suppliers are not required to establish plants on the SEMS platform, but they need to apply for API access credentials and establish a licensing agreement. Subsequently, they must add devices to the whitelist and obtain authorization from end users. Once these steps are completed, third-party suppliers can access the authorized devices listed in the whitelist.

Through the Real-time Data Monitoring API, third-party suppliers can retrieve real-time data from inverters. It supports simultaneous data retrieval from multiple inverters but does not facilitate remote control.

Table 3- Main Functions of Real-time Data Monitoring API

Obtain a list of authorized inverters	Obtain Inverter operating/alarm data
Obtain BMS data (second level)	Obtain Inverter production data
Obtain Power grid status (second level)	Obtain Power station information

Batch Remote Control Interface

The Batch Remote Control Interface enables third-party service suppliers to remotely control devices. Its usage conditions mirror those of the Real-Time Data Monitoring API, restricting control to authorized inverters listed on the whitelist. The Batch Remote Control interface is frequently employed for dynamic grid management by utility companies.

Batch Remote Control Interface uses KAFKA subscription method to communicate between third-party entities and our device interfaces. KAFKA subscription involves third parties publishing messages to specific topics, which are then consumed by the system, with responses published to different topics for users to retrieve. This process involves classification of topics across distinct interfaces.

Table 4- Main Functions of Batch Remote Control Interface

Single parameter	Batch	Inquire
1.Single parameter control command request Topic	1.Batch control command request Topic	1.Control parameter information query request Topic
2.Single parameter control result acquisition Topic	2.Obtain batch control results Topic	2.Control parameter information query results Topic

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GoodWe provides API services for data forwarding and batch remote control through HTTPS protocol and KAFKA, offering three types of APIs—OpenAPI for business data, Real-time Data Monitoring API for raw data, and Batch Remote Control Interface for remote control functions—tailored to different application scenarios and requirements.

The API service is administered by the GoodWe SEMS (Smart Energy Management System) team. Interested parties can contact the GoodWe service team to inquire about this service.

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