IIoT Libraries SL

The software package “IIoT Libraries SL” contains libraries for “IIoT communication” and libraries for reading and writing of data structures.

Product description

The product “IIoT Libraries SL” contains numerous libraries to support different communication protocols (for example, MQTT and HTTPS) and includes tools for encoding and decoding data structures (for example, JSON and XML). Moreover, libraries with POUs for direct communication with cloud services of individual providers (AWS, Azure, etc.) are provided. The components contained in the CODESYS package are ideally suited for communication in the IIoT environment.

Libraries for communication

Web Client SL

The CODESYS software package includes a library with function blocks for communicating with a web server via HTTP or HTTPS.

- The HTTP method GET requests data from a web server.
- The HTTP methods POST and PUT submit data from the controller to a web server.
- When using DELETE, data is deleted from a web server.
- The HTTP method HEAD returns the HTTP header.

The HTTP header of a request can be extended without any restrictions. In addition, function blocks are included for HTTP basic authentication and authentication via OAuth (Version 1a and 2).

MQTT Client SL

MQTT (Message Queuing Telemetry Transport) is an open-source IoT protocol that allows for the transmission of telemetry data as messages between devices. Device communication always takes place by means of an MQTT broker (e.g. Mosquitto https://mosquitto.org/). Messages are sent and subscribed to based on topics. A topic corresponds to a path (e.g. device1/temperature). Subscribing to messages is done by specifying a topic filter. Wildcards are also permitted (+ for one level and # for multiple levels). The message format is not fixed, which means that a JSON string or any data structure can be transmitted.

With the “MQTT Client SL” library, messages can be sent from a CODESYS controller to an MQTT broker, and messages can be subscribed to based on topics.

Mail Service SL

This library contains function blocks for sending, receiving, and deleting emails by means of SMTP and POP3 protocols. Communication with the mail server can be established either encrypted (TLS) or unencrypted. A sample project demonstrates how to use the function blocks.

SMS Service SL

With this library it is possible to send, receive and delete short messages via a GSM modem.

SNMP Service SL

This library makes it possible to read device information of printers, routers etc. via the SNMP protocol. The library provides function blocks to send and receive SNMP messages. The package contains the SNMP library and example applications.

Supported SNMP features:

- SNMP GET: Request a value.
- SNMP GET_NEXT: Request a value and get the OID from the next value.
- SNMP Agent: Enables devices to request values from the control (agent).
- SNMP TRAP: Send and receive TRAP/INFORM telegrams.

- SNMP SET: Set values via SNMP

The package `SNMP Service SL.package` contains following components:

- SNMPServiceSL (Namespace: SNMP)
- Project with example applications
- CHM help
- Product datasheet

SNTP Service SL

The library SNTP Service SL contains function blocks for easy implementation of SNTP client and server components on a CODESYS control (SNTP V3, SNTP V4). The function block `SNTPGetUTCTime` can be used to request the UTC time of a SNTP/NTP server. The function block `SNTPServer` can be used to build a simple SNTP server.

Function blocks (FBs) of the SNTP library:

- `SNTPGetUTCTime`: FB to request the time of a SNTP server (SNTP client)
- `SNTPServer`: FB to send the local server time (SNTP server)

AWS IoT Core Client SL

The “AWS IoT Core” service is a managing cloud platform from Amazon in which connected devices can work together easily and safely with cloud applications and other devices. The “AWS IoT Core Client SL” library provides function blocks for sending and receiving messages. Communication is encrypted and takes place by means of the MQTT protocol. In the AES environment, messages are typically transmitted in JSON format. The “JSON Utilities” library can be used for parsing and creating JSON files.

Azure IoT Hub Client SL

The “Azure IOT Hub” cloud service from Microsoft directly links IoT devices. (For more detailed information, refer to https://azure.microsoft.com/en-us/services/iot-hub/). The “Azure IoT Hub Client SL” library provides function blocks for sending and receiving messages. A sample project demonstrates how to use the library.

Google Cloud IoT Core Client SL

The ‘Google Cloud IoT Core’ cloud service from Google is a service for directly connecting IoT devices. (For more information, see https://cloud.google.com/iot-core?hl.)

The ‘Google Cloud IoT Core Client SL’ library provides function blocks for sending and receiving messages. A sample project demonstrates how to use the library.

JSON Web Token SL

The ‘JSON Web Token SL’ library contains a function block for creating a JWT (JSON Web Token) on the controller. For this purpose, the algorithms HS256, HS384, HS512, and RS256 are supported.

The ‘JSON Web Token SL’ package contains the following components:

- IEC 61131-3 library `JSON Web Token SL` (namespace JWT)
- Sample project `JSON Web Token SL Example.project`
- Programming reference as integrated CHM help
- Product data sheet (German and English)

Libraries for reading and writing of data structures

CSV Utility SL

The library `CSV Utility SL` provides function blocks to read and write CSV files. The library contains the components `CSVReader` (read a CSV file) and `CSVWriter` (write a CSV file). All function blocks can be used in a classical or object oriented way. An example project demonstrates the usage of all components.

INI File Utility SL

The product “INI File Utility SL” is a library to read and write INI files. The library contains function blocks to read, write and find values of INI files. An example project shows the usage of the library and their function blocks.

Content of the package:

- Library `INI File Utility SL` (Namespace: `INI_UTIL`)
- Example project with visualization to read, write and find values of INI files

- CHM help file

JSON Utilities SL

The ‘JSON Utilities SL’ library provides the following functionalities:

- Read JSON files (UTF-8 and UTF-16)
- Read JSON byte arrays
- Write JSON files (UTF-8 and UTF-16)
- Read JSON byte arrays
- Search for keys, values, and child and parent elements

The data is stored in an array of structures. Data access and element search is performed by means of methods from the `JSONData` function block. The function blocks `JSONByteArrayReader` and `JSONFileReader` read data in JSON format and save the values in the `JSONData` function block. Writing files and byte arrays is performed by means of the function blocks `JSONFileWriter` and `JSONByteArrayWriter`.

A simple REST client can be implemented easily in connection with the library ‘Web Client SL’.

XML Utility SL

The library “XML Utility SL” contains function blocks to read and write xml files or xml strings on a control. All elements of the xml file are stored in an array of structures. The library also contains function blocks to find elements by name and attribute. The usage of the library is demonstrated by two example applications.

The library contains following components:

- IEC 61131-3 library `XML Utility SL` (Namespace XML)
- Example project `XML Utility SL Example.project`
- Integrated CHM programming reference
- Product data sheet (de und en)

The product data sheets of the individual libraries are installed in the target directory “IIoT Libraries SL” when the CODESYS package is installed.

General information

Vendor:

CODESYS GmbH
Memminger Strasse 151
87439 Kempten
Germany

Support:

https://support.codesys.com

Item:
IIoT Libraries SL
Item number:
Sales:

CODESYS Store
https://store.codesys.com

Included in delivery:

- CODESYS package with libraries and sample projects on the subject of IIoT
- SL License

System requirements and restrictions

Development system	CODESYS Development System V3.5.14.0
Runtime	CODESYS Control V3.5.14.0
Supported platforms and devices	Note: Use the “Device Reader” project for locating the functions supported by the PLC.
Additional requirements	The libraries Web Client SL, MQTT Client SL, Mail Service SL, AWS IoT Core Client SL, Azure IoT Hub Client SL and Google Cloud IoT Core Client SL require amongst others the libraries SysSocket2 3.5.16.0, Net Base Services, CmpCrypto, CmpTls 3.5.15.0 and CmpX509Cert. The libraries CSV Utility SL, INI File Utility SL, JSON Utilities SL and XML Utility SL require amongst others the library SysFile. The library SMS Service SL requires amongst others the library SysCom.
Restrictions	-
Licensing	License activation is optional on the CODESYS Key or Soft Key (free component of CODESYS Control). Licensing by means of the Soft Key is bound to the hardware. Note: Without a license, the software runs for 30 minutes in demo mode.
Required accessories	-

Note: Not all CODESYS features are available in all territories. For more information on geographic restrictions, please contact sales@codesys.com.
Note: Technical specifications are subject to change. Errors and omissions excepted. The content of the current online version of this document applies.