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SunSpec Modbus Conformance for IEEE 1547-2018 Test Procedures

SunSpec Specification



Abstract

This document specifies the conformance test procedures for compliance with the requirements specified in the *SunSpec Device Information Model Specification* and the associated specific SunSpec information model specifications.

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Revision History

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1.0	07-08-2024	Initial Release

About the SunSpec Alliance

The SunSpec Alliance is a trade alliance of developers, manufacturers, operators, and service providers together pursuing open information standards for the distributed energy industry. SunSpec standards address most operational aspects of PV, storage, and other distributed energy power plants on the smart grid, including residential, commercial, and utility-scale systems, thus reducing cost, promoting innovation, and accelerating industry growth.

Over 160 organizations are members of the SunSpec Alliance, including global leaders from Asia, Europe, and North America. Membership is open to corporations, non-profits, and individuals. For more information about the SunSpec Alliance, or to download SunSpec specifications at no charge, visit sunspec.org.

About the SunSpec Specification Process

SunSpec Alliance specifications are initiated by SunSpec members to establish an industry standard for mutual benefit. Any SunSpec member can propose a technical work item. Given sufficient interest and time to participate, and barring significant objections, a work group is formed, and its charter is approved by the board of directors. The workgroup meets regularly to advance the agenda of the team.

The output of the workgroup is generally in the form of a SunSpec Interoperability Specification. These documents are normative, meaning that there is a matter of conformance required to support interoperability. The revision and associated process of managing these documents is tightly controlled. Other documents are informative, or make some recommendation about best practices, but are not a matter of conformance. Informative documents can be revised more freely and more frequently to improve the quality and quantity of information provided.

SunSpec Interoperability Specifications follow a lifecycle pattern of: DRAFT, TEST, APPROVED, and SUPERSEDED.

For more information or to download a SunSpec Alliance specification, go to <https://sunspec.org/about-sunspec-specifications/>.

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1 Introduction

This document specifies the SunSpec Modbus test procedures for IEEE 1547-2018 Conformance testing. For conformance with IEEE 1547-2018, all the tests in the SunSpec Modbus Conformance Test Procedures MUST be performed successfully. In addition, the tests mentioned in this document MUST be performed successfully.

2 Test Procedures

This section provides the test procedures for SunSpec Modbus for IEEE 1547-2018 compliance.

2.1 Test Inputs

SunSpec Modbus compliance testing for a device is based on the functionality supported by the device. The device protocol implementation conformance statement (PICS) is used to specify the SunSpec Modbus functional content.

The device PICS is an Excel workbook that specifies the SunSpec models and points that are supported in the implementation along with the supported value ranges associated with each adjustable point. A SunSpec Modbus PICS template can be obtained from the SunSpec Alliance.

Due to the detailed nature of the PICS content, the SunSpec Dashboard software, available at no cost to SunSpec member companies, can be used to generate an initial PICS for a device implementation. The SVP Dashboard probes the contents of the device through the SunSpec Modbus interface and creates an initial PICS workbook based on the content found in the device. The generated PICS workbook must then be updated to provide details that were not able to be discovered during the initial discovery process.

Only SunSpec standardized models are considered during certification testing. Any additional vendor-specific models must conform to SunSpec information modeling rules to the extent that they do not inhibit discovery and use of the standardized model supported in the device.

SunSpec Modbus certification profiles specify conformance criteria for the specific profile including required models, points, and value ranges that must be supported. Profiles are developed for specific use cases. For example, the SunSpec Modbus profile for IEEE 1547-2018 is used to create an inverter interface that complies with the IEEE 1547-2018 standard. The standard SunSpec Modbus certification testing is performed, and profile requirements are then matched to testing results to determine which profiles the device is in conformance with.

2.2 Test Categories

The SunSpec Modbus conformance tests fall into the following general categories: general device tests, general model tests, curve tests, reversion tests, and Modbus protocol tests.

General device tests are performed once for a device.

General model tests are performed once for each SunSpec model implemented in the device.

Curve tests are performed for each curve-based model implemented in the device.

Reversion tests are performed for each reversion timer implemented in models contained in the device.

Modbus protocol tests are performed once for a device.

2.3 General SunSpec Model Tests

In addition to the General SunSpec Model Tests in the SunSpec Modbus Conformance Test Procedures, this test MUST be performed.

2.3.1 MOD-4 – Mandatory Points

This test validates all the points required for IEEE 1547 implementation are present in the device. The list of these points can be found in the [SunSpec Modbus IEEE 1547-2018 Profile Specification and Implementation Guide](#).

2.3.1.1 Procedure

1. For each model, read the point in the model.
2. Compare the point to the list of mandatory points for IEEE 1547 implementation.
3. Verify all the required points are implemented in the model.
4. Verify every required model is implemented.

2.4 Scale Factor Test

The scale factor test verifies the scale factors are valid and in the correct range.

2.4.1 Procedure

For each implemented point that has a scale factor:

1. Read the corresponding scale factor value.
2. Verify the scale factor value lies in the acceptable range to meet the IEEE 1547 requirements based on the data type of the corresponding point.