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Test Procedure for Validating DNP Application Note AN2018-001 in Distributed Energy Resources

Example Test Procedure for Evaluating Conformance to DNP Application Note AN2018-001 – "DNP3 Profile for Communications with Distributed Energy Resources"

3002016144

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Technical Update, May 2019

EPRI Project Manager

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ACKNOWLEDGMENTS

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This report describes research sponsored by EPRI.

The development of this document was funded by the CEC through the Electric Program Investment Charge (EPC-15-089), which funds clean energy research, demonstration, and deployment projects that support California's energy policy goals and promote enhanced reliability and safety, at lower costs.

Project Team:
EPRI
Enernex
MESA Standards Alliance
SunSpec Alliance
Xanthus Consulting International

This publication is a corporate document that should be cited in the literature in the following manner:

Test Procedure for Validating DNP Application Note AN2018-001 in Distributed Energy Resources: Example Test Procedure for Evaluating Conformance to DNP Application Note AN2018-001 – "DNP3 Profile for Communications with Distributed Energy Resources". EPRI, Palo Alto, CA: 2019. 3002016144.

ABSTRACT

Standards for smart inverter communications are relatively new to the industry but are rapidly gaining popularity as utilities are seeing benefits in controlling smart inverters to provide visibility in generation of DER and providing controllability of these resources. Many of the standards used today have been around for a long time. However, their application to smart inverters is new. This means that the industry is learning how to apply these technologies in the smart inverter domain. Implementers of standards and requirements may misunderstand requirements, vague language can create confusion, and mistakes can be made. Conformance testing validates that standards and requirements are met through testing and validation and reduces the cost to fix these issues after they make it into the field by identifying them upfront.

This document is an example test procedure for validating DNP3 Profile for Communications with Distributed Energy Resources (DERs), DNP Application Note AN2018-001. The intention of this document is to provide an example of the test procedures and pass/fail criteria that could be used to test the implementation of DNP Application Note AN2018-001. An organization interested in performing conformance testing of this application note could use this as a template.

The conformance testing framework is designed to be scalable. It was developed to support all the requirements in Application Node AN2018-001. It can therefore support testing of any document that specifies conformance to this application node including the IEEE 1547-2018 standard and California Rule 21 interconnection requirements. It is likely that profiles could be developed in the future that subdivide the test procedure to focus on the requirements in an individual specification. For example, a subset of the tests could be used to validate a DER's ability to meet California Rule 21 communication requirements over a DNP3 network. This scalability is a strength of the approach taken in this framework because of the flexibility it provides.

Keywords

Grid Interoperability
Grid Resiliency
Energy Storage Systems
Solar Photovoltaic
California Rule 21
Open Source Software
Conformance Testing

LEGAL NOTICE

The development of this software is funded by the CEC through the Electric Program Investment Charge (EPC-15-089), which funds clean energy research, demonstration, and deployment projects that support California's energy policy goals and promote enhanced reliability and safety, at lower costs.

CONTENTS

ABSTRACT v

1 **FRAMEWORK TO VALIDATE STANDARDS CONFORMANCE** 1-1

2 **INTRODUCTION** 2-1

Test Scope 2-1

Protocol Implementation Conformance Statement 2-2

Automated Generation of PICS 2-2

3 **FUNCTION TESTS** 3-1

3.1 Monitoring – MON-001 3-1

Purpose 3-1

Procedure 3-1

Criteria 3-1

3.2 Alarm Reporting – ALARM-001 3-1

Purpose 3-1

Procedure 3-1

Criteria 3-1

3.3 Connect and Disconnect – CONN-001 3-1

Purpose 3-1

Procedure 3-1

Criteria 3-2

3.4 Cease to Energize and Return to Service – SERV-001 3-2

Purpose 3-2

Procedure 3-2

Criteria 3-3

3.5 Operation States – OP-001 3-3

Purpose 3-3

Procedure 3-3

Criteria 3-3

4 **GENERIC CURVE MANAGEMENT TESTS** 4-1

4.1 Reference Indication Test – CURVE-001 4-1

Purpose 4-1

Procedure 4-1

Criteria 4-1

4.2 Curve Locking Test – CURVE-002 4-1

Purpose 4-1

Procedure 4-1

Criteria 4-2

4.3 Mode Type Mismatch Test – CURVE-003 4-2

Purpose 4-2

Procedure....4-2
Criteria....4-2
***5* MODE TESTS....5-1**
5.1 Low/High Voltage Ride-Through Mode – VRT-001....5-1
Purpose....5-1
Procedure....5-1
Criteria....5-2
5.2 Low/High Frequency Ride-Through Mode – FRT-001....5-2
Purpose....5-2
Procedure....5-2
Criteria....5-3
5.3 Frequency-Watt Mode – FW-001....5-3
Purpose....5-3
Procedure....5-3
Criteria....5-4
5.4 Dynamic Reactive Current Support Mode – DRCS-001....5-4
Purpose....5-4
Procedure....5-4
Criteria....5-5
5.5 Dynamic Volt-Watt Mode – DVW-001....5-6
Purpose....5-6
Procedure....5-6
Criteria....5-7
5.6 Active Power Limit Mode – APL-001....5-7
Purpose....5-7
Procedure....5-7
Criteria....5-8
5.7 Charge/Discharge Storage Mode – CHG-001....5-8
Purpose....5-8
Procedure....5-8
Criteria....5-9
5.8 Coordinated Charge/Discharge Management Mode – CCM-001....5-9
Purpose....5-9
Procedure....5-9
Criteria....5-10
5.9 Active Power Response Mode 1 – APR1-001....5-10
Purpose....5-10
Procedure....5-10
Criteria....5-11
5.10 Active Power Response Mode 2 – APR2-001....5-11
Purpose....5-11

Procedure....5-11
Criteria....5-12
5.11 Active Power Response Mode 3 – APR3-001....5-12
Purpose....5-12
Procedure....5-13
Criteria....5-13
5.12 Automatic Generation Control Mode – AGC-001....5-14
Purpose....5-14
Procedure....5-14
Criteria....5-15
5.13 Active Power Smoothing Mode – APS-001....5-15
Purpose....5-15
Procedure....5-15
Criteria....5-16
5.14 Volt-Watt Mode – VW-001....5-16
Purpose....5-16
Procedure....5-16
Criteria....5-17
5.15 Frequency-Watt Curve Mode – FWC-001....5-17
Purpose....5-17
Procedure....5-17
Criteria....5-18
5.16 Constant Vars Mode – CVAR-001....5-19
Purpose....5-19
Procedure....5-19
Criteria....5-19
5.17 Fixed Power Factor Mode – FPF-001....5-20
Purpose....5-20
Procedure....5-20
Criteria....5-20
5.18 Volt-Var Control Mode – VV-001....5-21
Purpose....5-21
Procedure....5-21
Criteria....5-22
5.19 Watt-Var Power Mode – WV-001....5-22
Purpose....5-22
Procedure....5-22
Criteria....5-23
5.20 Power Factor Correction Mode – PFC-001....5-23
Purpose....5-23
Procedure....5-23

Criteria....5-24
5.21 Pricing Signal Mode – PSIG-001....5-24
Purpose....5-24
Procedure....5-24
Criteria....5-25
***6* SCHEDULING TESTS....6-1**
6.1 Schedule Mode Basic Test – SCHED-001....6-1
Purpose....6-1
Procedure....6-1
Criteria....6-1
***A* PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT....A-1**
Spreadsheet Tab Name: *Instructions*....A-2
Spreadsheet Tab Name: *Certification Info*....A-3
Spreadsheet Tab Name: *Testing Info*....A-3
Spreadsheet Tab Name: *BI*....A-4
Spreadsheet Tab Name: *BO*....A-6
Spreadsheet Tab Name: *AI*....A-7
Spreadsheet Tab Name: *AO*....A-21
Spreadsheet Tab Name: *C*....A-33

LIST OF FIGURES

Figure 1-1 Components of the Infrastructure for Product Certification and Testing.....1-2
Figure 2-1 Example Entries in a Protocol Information Conformance Statement (PICS).....2-2

LIST OF TABLES

Table 3-1 Specific Function Test for Connect and Disconnect 3-1
Table 3-2 Specific Function Test for Cease to Energize and Return To Service 3-2
Table 5-1 Specific Test Points for Low/High Voltage Ride-Through Mode 5-1
Table 5-2 Specific Test Points for Low and High Frequency Ride-Through Mode 5-2
Table 5-3 Specific Test Points for Frequency-Watt Mode 5-3
Table 5-4 Specific Test Points for Dynamic Reactive Current Support Mode 5-5
Table 5-5 Specific Test Points for Dynamic Volt-Watt Mode 5-6
Table 5-6 Specific Test Points for Active Power Limit Mode 5-7
Table 5-7 Specific Test Points for Charge and Discharge Storage Mode 5-8
Table 5-8 Specific Test Points for Coordinated Charge and Discharge Management Mode 5-9
Table 5-9 Specific Test Points for Active Power Response Mode 1 5-10
Table 5-10 Specific Test Points for Active Power Response Mode 2 5-12
Table 5-11 Specific Test Points for Active Power Response Mode 3 5-13
Table 5-12 Specific Test Points for Automatic Generation Control Mode 5-14
Table 5-13 Specific Test Points for Active Power Smoothing Mode 5-15
Table 5-14 Specific Test Points for Volt-Watt Mode 5-16
Table 5-15 Specific Test Points for Frequency-Watt Curve Mode 5-17
Table 5-16 Specific Test Points for Constant Vars Mode 5-19
Table 5-17 Specific Test Points for Fixed Power Factor Mode 5-20
Table 5-18 Specific Test Points for Volt-Var Control Mode 5-21
Table 5-19 Specific Test Points for Watt-Var Power Mode 5-22
Table 5-20 Specific Test Points for Power Factor Correction Mode 5-23
Table 5-21 Specific Test Points for Pricing Signal Mode 5-24

1
FRAMEWORK TO VALIDATE STANDARDS CONFORMANCE

Standards for smart inverter communications are relatively new to the industry but are rapidly gaining popularity as utilities are seeing benefits in controlling smart inverters to provide visibility in generation of DER and providing controllability of these resources. Many of the DER-supported standards have been around for a long time (e.g., Modbus, DNP3, and IEC-61850) and are used across the world for managing distribution system equipment. However, the application of advanced smart inverter functions are new additions. This means that the industry is learning how to apply these standards in the smart inverter domain.

Standards can help enable "plug-and-play"[1] DER, but experience [2,3,4] says that even with robust standards, unforeseen implementation barriers can arise. Implementers of standards may misunderstand requirements, vagueness in language can create confusion, and mistakes can be made. Inverter conformance pre-testing validates that standards and implementers meet the requirements. A testing and certification process reduces the cost to fix these issues after they are deployed in the field by identifying non-conformance upfront, so it can be fixed.

[1] "Plug-and-play" is a phrase describing the capability of devices to work together as soon as they are connected.

[2] *Evaluation of SunSpec Modbus for Distributed Energy Resources: Results from EPRI Interoperability Testing and Market Research*. EPRI, Palo Alto, CA: 2017. 3002009854.

[3] *Assessment of Interoperability Achieved through IEEE Std 1547-2018 and IEEE P1547.1: Results from EPRI Interoperability Testing and Market Research*. EPRI, Palo Alto, CA: 2018. 3002013473.

[4] "Standard Communication Interface and Certification Test Program for Smart Inverters". Electric Power Research Institute. California Public Utilities Commission – California Solar Initiative. http://www.calsolarresearch.ca.gov/images/stories/documents/Sol4_funded_proj_docs/EPRI4_Seal/2_CSI-RDD_Sol4_EPRI-Seal_StdCommInt_CertTestProg_FinalRpt_2016-08.pdf. Accessed March 2019.

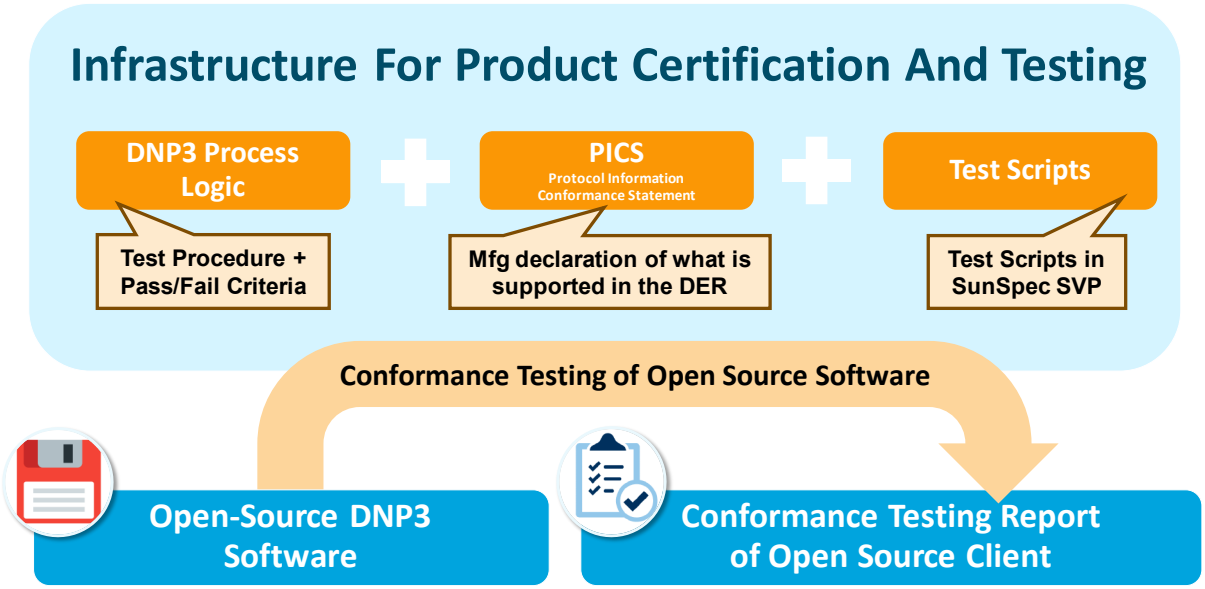

Figure 1-1
Components of the Infrastructure for Product Certification and Testing

A collaborative team led by the Electric Power Research Institute (EPRI) and including the DNP Users Group, Enernex, the MESA Standards Alliance (MESA), the SunSpec Alliance, and Xanthus Consulting sought to improve the ability of grid operators to communicate with distributed energy resources (DER) and enhance the use and value of energy storage and solar generation. To address the comprehensive testing requirements, an Infrastructure for Product Certification Testing was created as a framework to support certification efforts related to DNP3 for distributed energy resources. The infrastructure for product certification and testing comprised of three components (Figure 1-1).

DNP3 Process Logic: Defines the test procedure and pass/fail criteria for the requirements defined in *DNP Application Note AN2018-001 – DNP3 Profile for Communications with Distributed Energy Resources*.

Protocol Information Conformance Statement (PICS): A list defining which parameters in the DNP Application Note are supported or unsupported by the product under test. Supported and unsupported points must follow different pass/fail criteria. This document informs the testers which tests need be performed on the distributed energy resource.

SunSpec Test Software: Testers send and receive messages from the distributed energy resource to determine if it supports DNP3 correctly. SunSpec used their existing SunSpec System Validation Platform (SVP)[5] to create scripts to automate testing and validation of pass/fail criteria.

[5] SunSpec System Validation Platform (SVP). SunSpec Alliance. https://sunspec.org/sunspec-system-validation-platform-2/. Accessed March 2019.

This document – DNP3 Process Logic – specifies test procedures for the DNP AN 2018-001. This document contains sample test procedures and pass/fail criteria to test the implementation of DNP Application Note AN2018-001. An organization interested in performing conformance testing of this application note could use this as a template. The framework for conformance testing supports the following test cases:

- Monitoring
- Alarm Grouping and Reporting
- Connect and Disconnect
- Cease to Energize and Return to Service
- Operation States
- Time Synchronization
- Event/History Logging
- Generic Curve Management Tests
- Reference Indication Test
- Curve Locking Test
- Mode Type Mismatch Test
- Low/High Voltage Ride-Through Mode
- Low/High Frequency Ride-Through Mode
- Frequency-Watt Mode
- Dynamic Reactive Current Support Mode
- Dynamic Volt-Watt Mode
- Active Power Limit Mode
- Charge/Discharge Storage Mode
- Coordinated Charge/Discharge Management Mode
- Active Power Response
- Automatic Generation Control Mode
- Active Power Smoothing Mode
- Volt-Watt Mode
- Frequency-Watt Curve Mode
- Constant Vars Mode
- Fixed Power Factor Mode
- Volt-Var Control Mode
- Watt-Var Power Mode
- Power Factor Correction Mode
- Pricing Signal Mode
- Scheduling Tests

The conformance-testing framework is scalable. It supports all the requirements in Application Node AN2018-001. It can therefore support testing of any requirement that specifies conformance to this application node including the IEEE 1547-2018 standard and California Rule 21 interconnection requirements. It is likely that the industry could develop profiles in the future to sub-divide the test procedure to test explicitly for the requirements in these requirements. For example, a subset of the tests could be used to confirm a DER's ability to meet California Rule 21 communication requirements over a DNP3 network. This scalability is a strength of the approach taken in this framework because of the flexibility it provides.

2
INTRODUCTION

This document specifies test procedures for the *DNP3 Profile for Communications with Distributed Energy Resources (DERs)*, DNP Application Note AN2018-001[6].

The points and criteria tested in this Process Logic Document are from *Application Note AN2018-001 DNP3 Profile for Communications with Distributed Energy Resources (DERs)* which is held under copyright by the DNP Users Group. This document can be obtained by members of the DNP Users Groups at *https://www.dnp.org/*

Test Scope

The tests specified in this document validate data exchange with an outstation implementation. The tests are intended to verify the following functionality:

- Able to obtain all required input points associated with tested functionality
- Able to update all required output points associated with tested functionality
- Validate that input points mapped to output points perform correctly
- Validate generic curve management functionality
- Validate points are implemented or marked as unimplemented consistent with the logical point groups in which they reside.

The tests do not validate any functional behavior associated with the point values other than the consistently requirements outlined above. The tests are organized and performed with the assumption that the underlying function is being executed. If further testing is required to validate functional behavior this test produce would need to be modified to add additional monitoring points and pass-fail criteria. An example of this is the interoperability testing in IEEE 1547.1-2018.

All the tests use a protocol implementation conformance statement (PICS) to determine which points are supported and should be tested. If no conformance statement is provided, all points specified in the test procedures are tested.

[6] DNP Users Group, DNP3 Application Note AN2018-001 - DNP3 Profile for Communications with Distributed Energy Resources. January 2019, https://www.dnp.org/LinkClick.aspx?fileticket=BiDPDkwxy70%3d&portalid=0&timestamp=1553622205077. Accessed March 2019.

Protocol Implementation Conformance Statement

The Protocol Implementation Conformance Statement (PICS) is a list provided by a manufacturer to define a device's support of the various mandatory and optional parameters from the DNP Application Note AN2018-001. Supported and unsupported points must follow different pass/fail criteria. This document informs the testers which tests are required, is completed by the entity submitting their product for testing and is a key for determining systems interoperability.

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
BO16	Enable Frequency-Watt Mode	TRUE	TRUE	10	2	BI68	129	TRUE			
BO17	Enable Active Power Limit Mode	TRUE	TRUE	10	2	BI69	1	FALSE			
BO18	Enable Charge/Discharge Mode	FALSE	TRUE	10	2	BI70	2	FALSE			
BO19	Enable Coordinated Charge/Discharge Mode	FALSE	TRUE	10	2	BI71	2	FALSE			
BO20	Enable Active Power Response Mode #1	FALSE	TRUE	10	2	BI72	2	FALSE			
BO21	Enable Active Power Response Mode #2	FALSE	TRUE	10	2	BI73	2	FALSE			
BO22	Enable Active Power Response Mode #3	FALSE	TRUE	10	2	BI74	2	FALSE			
BO23	Enable Automatic Generation Control Mode	FALSE	TRUE	10	2	BI75	2	FALSE			
BO24	Enable Active Power Smoothing Mode	FALSE	TRUE	10	2	BI76	2	FALSE			
BO25	Enable Volt-Watt Mode	TRUE	TRUE	10	2	BI77	129	TRUE			
BO26	Enable Frequency-Watt Curve Mode	FALSE	TRUE	10	2	BI78	2	FALSE			
BO27	Enable Constant VArs Mode	TRUE	TRUE	10	2	BI79	129	TRUE			
BO28	Enable Fixed Power Factor Mode	TRUE	TRUE	10	2	BI80	1	FALSE			
BO29	Enable Volt-VAR Control Mode	TRUE	TRUE	10	2	BI81	129	TRUE			
BO30	Enable Watt-VAr Mode	TRUE	TRUE	10	2	BI82	1	FALSE			

Figure 2-1
Example Entries in a Protocol Information Conformance Statement (PICS)

Figure 2-1 shows example entries in the PICS for each parameter. Appendix A contains snapshots of the full PICS developed to support testing. A copy of the excel version can be obtained through EPRI or the SunSpec Alliance.

Automated Generation of PICS

Application Note AN2018-001 contains ~1,300 possible parameters. This includes about 340 Binary Inputs, 50 binary outputs, 630 analog inputs, and 340 analog outputs. Manually completing the PICS is laborious due to the considerable number of parameters. This may lead to errors in completing the PICS. Therefore, SunSpec developed an automated approach to use the SunSpec System Validation Platform (SVP) to automatically populate the PICS with supported and unsupported values based on the standard definitions for supported and unsupported values as defined in the application note. An entity sending their product for testing would then review the automatically created PICS for errors. Any errors are signs of implementation issues in the product under testing.

3
FUNCTION TESTS

3.1 Monitoring – MON-001

Purpose

Verify access to the supported read-only measurement points.

Procedure

Obtain the points from AI533 through AI556 that are specified as supported in the PICS.

Criteria

Verify all values are obtained and are valid for the applicable data point.

3.2 Alarm Reporting – ALARM-001

Purpose

Verify access to the supported alarm points.

Procedure

Obtain the alarm points in the following ranges that are specified as supported in the PICS: BI0-BI9, BI94-BI105.

Criteria

Verify all values are obtained and are valid for the applicable data point.

3.3 Connect and Disconnect – CONN-001

Purpose

Verify settings can be properly obtained and updated for the Connect and Disconnect function if the function is supported.

Procedure

The following table contains the function specific points to be used in this test.

Table 3-1
Specific Function Test for Connect and Disconnect

Input	Output	Point
AI60	AO16	Time Window
AI61	AO17	Reversion Timeout Period
BI23	BO5	Switch Closed Status
BI24	---	DER Connect/Disconnect Switch Movement Status

1. Obtain the points contained in the table specified in the Input column that are specified as supported in the PICS.
2. If the Switch Closed Status point is not supported, skip subsequent test steps.
3. For all the settings in Output column of the table that are supported, transmit valid settings.
4. For all the settings in the Input column of the table that are supported, obtain values.
5. Repeat steps 3-4 using the values using different valid settings than previously applied.
6. If the current value is 0, update the Switched Closed Status to 1.

Criteria

- After step 2, if the Switch Closed Status is not supported, skip subsequent test criteria.
- After step 3, for all the settings that are updated, verify the values match the values applied.
- After step 4, verify all the setting values match the values match the updated valued applied.
- After step 6, verify the mode is disabled and the value of Switched Closed Status is 1.

3.4 Cease to Energize and Return to Service – SERV-001

Purpose

Verify settings can be properly obtained and updated for the Cease to Energize and Return to Service function if the function is supported.

Procedure

The following table contains the function specific points to be used in this test.

Table 3-2
Specific Function Test for Cease to Energize and Return To Service

Input	Output	Point
AI50	AO6	Voltage High Limit
AI51	AO7	Voltage Low Limit
AI52	AO8	Frequency High Limit
AI53	AO9	Frequency Low Limit
AI54	AO10	Delay
AI55	AO11	Time Window
AI56	AO12	Ramp Up Time
AI57	AO13	Time Window
AI58	AO14	Ramp Down Time
AI59	AO15	Reversion Timeout Period
BI12	BO1	Initiate Start-Up Sequence
BI13	---	Stopping
BI14	BO2	Execute Stop
BI15	---	Stopped

Input	Output	Point
BI16	BO3	Permission to Start
BI17	BO4	Permission to Stop

1. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
2. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
3. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
4. Repeat steps 2-3 using a different set of valid values.
5. Set the Permission to Stop output to 1 and obtain all supported input values.
6. Set the Execute Stop output to 1 and obtain all supported input values.
7. Set the Permission to Start output to 1 and obtain all supported input values.
8. Set the Initiate Start-Up Sequence output to 1 and obtain all supported input values.

Criteria

- After step 1, verify all the input values obtained are ONLINE.
- After step 3, verify the input values match the values previously transmitted.
- After step 4, verify all the input values match the second set of values previously transmitted.
- After step 5, verify the Permission to Stop input value is 1.
- After step 6, verify the Execute Stop input value is 1.
- After step 7, verify the Permission to Start input value is 1.
- After step 5, verify the Initiate Start-Up Sequence input value is 1.

3.5 Operation States – OP-001

Purpose

Verify access to the supported operation states.

Procedure

1. Obtain the supported alarm points in the following from BI10 through BI22 that are specified as supported in the PICS.

Criteria

- Verify all values are obtained and are valid for the applicable data point.

4
GENERIC CURVE MANAGEMENT TESTS

The tests in this section verify the generic curve functionality specified in section 2.3.3 of the standard. This functionality is required for any mode that utilizes a curve.

4.1 Reference Indication Test – CURVE-001

Purpose

This test verifies the proper setting and resetting of the referenced indication for a generic curve.

Procedure

1. Update all supported curve-based modes to a curve index of 0.
2. Determine the number of supported modes and associate a curve index with each mode starting with index 1.
3. For each index, select the curve index using the curve edit selector (AO244) and then obtain the current curve selected (AI328) and the selected curve referenced indicator (BI107).
4. Select curve 1 using the curve edit selector (AO244).
5. Obtain current curve selected (AI328).
6. Obtain the selected curve referenced indicator (BI107).
7. Update the curve settings to a valid curve configuration for the supported mode associated with index 1.
8. Update the curve index for the mode specified in the previous step.
9. Obtain the selected curve referenced indicator (BI107).

Criteria

- Verify all supported curve-based modes have a curve index of 0.
- Verify the curve index selected value matches the index last set for each index and the curve referenced indicator is 0 for each index processed in step 3.
- Verify curve index selected value is 1 after step 5.
- Verify curve referenced indicator value is 0 after step 7.
- Verify curve referenced indicator value is 1 after step 9.

4.2 Curve Locking Test – CURVE-002

Purpose

This test verifies the locking behavior for a curve that is referenced and enabled.

Procedure

1. Update a supported curve-based mode with valid curve settings and curve index.
2. Enable the mode using the mode enable flag.

3. Obtain the mode enable flag.
4. Select the curve index being used by the mode using the curve edit selector (AO244).
5. Obtain the current curve index selected (AI328).
6. Obtain the selected curve referenced indicator (BI107).
7. Obtain the current points.
8. Set a curve point in the selected curve to valid but different value than the current value.
9. Obtain the current curve points.

Criteria

- Verify mode enable flag is value of 1 after step 3.
- Verify curve index selected is curve index being used after step 5.
- Verify referenced indicator is value of 1 after step 6.
- Verify an ALREADY EXECUTING error occurred during step 8.
- Verify curve points are unchanged from the values in step 7.

4.3 Mode Type Mismatch Test – CURVE-003

Purpose

This test verifies validation checking for curve mode type when setting a curve for a mode.

Procedure

1. Select an available curve and update with valid mode settings for a supported curve mode.
2. Update the curve index to the prepared curve in a different supported curve mode.

Criteria

- Verify step 2 generates an error indicating a curve type mismatch.

5
MODE TESTS

This section contains the tests associated with the modes specified in the specification.

5.1 Low/High Voltage Ride-Through Mode – VRT-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-1
Specific Test Points for Low/High Voltage Ride-Through Mode

Input	Output	Point
AI71	AO22	Signal Meter ID
AI72	---	Voltage Reference Input
AI73	AO23	High Must Trip Curve Index
AI74	AO24	Low Must Trip Curve Index
AI75	AO25	High Momentary Cessation Curve Index
AI76	AO26	Low Momentary Cessation Curve Index
BI64	BO12	Enable Mode

1. Obtain supported flag for the mode (BI31) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. Update all supported curve-based modes to curve indexes of 0.
5. For each of the four curve types specified in the *Output* column that are supported, select a unique curve index and prepare a set of valid curve settings.
6. For all the settings in the table that are supported, transmit valid settings to the locations contained in the *Output* column.
7. Obtain all the settings in the table specified in the *Input* column corresponding to values that were transmitted.
8. Repeat steps 4-6 using different valid settings than previously applied.
9. Disable the mode and transmit a value of 0 to each of the four mode curve indexes.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 7, verify all the setting values obtained are ONLINE and the values match the first set of values previously transmitted.
- After step 8, verify all the setting values match the second set of values previously transmitted.
- After step 9, verify the mode is disabled and the value of all four mode curve indexes is 0.

5.2 Low/High Frequency Ride-Through Mode – FRT-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-2
Specific Test Points for Low and High Frequency Ride-Through Mode

Input	Output	Point
AI77	AO22	Signal Meter ID
AI78	AO23	Frequency Reference Input
AI79	AO24	High Must Trip Curve Index
AI80	AO25	Low Must Trip Curve Index
AI81	AO26	High Momentary Cessation Curve Index
AI82	AO27	Low Momentary Cessation Curve Index
BI65	BO13	Enable Mode

1. Obtain supported flag for the mode (BI32) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. Update all supported curve-based modes to curve indexes to 0.
5. For each of the four curve types specified in the *Output* column that are supported, select a unique valid curve index and prepare a set of valid curve settings.
6. For all the settings in the table, transmit valid values to the locations contained in the *Output* column.
7. Obtain all the settings in the table specified in the *Input* column corresponding to values that were transmitted.
8. Repeat steps 4-6 using different valid values.
9. Disable the mode and transmit a value of 0 to each of the four mode curve indexes.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 7, verify all the setting values obtained are ONLINE and the values match the first set of values previously transmitted.
- After step 8, verify all the setting values match the values previously transmitted from the second set of values.
- After step 9, verify the mode is disabled and the value of all four mode curve indexes is 0.

5.3 Frequency-Watt Mode – FW-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-3
Specific Test Points for Frequency-Watt Mode

Input	Output	Point
AI115	AO57	Mode Priority
AI116	AO58	Enabling Time Window
AI117	AO59	Enabling Ramp Time
AI118	AO60	Reversion Timeout Period
AI119	AO61	Signal Meter ID
AI120	---	Frequency Reference Input
AI121	AO62	High Starting Frequency
AI122	AO63	High Stopping Frequency
AI123	AO64	High Discharging/Generating Gradient
AI124	AO65	High Charging Gradient
AI125	AO66	Low Starting Frequency
AI126	AO67	Low Stopping Frequency
AI127	AO68	Low Discharging/Generating Gradient
AI128	AO69	Low Charging Gradient
AI129	AO70	Start Delay
AI130	AO71	Stop Delay
AI131	AO72	Ramp Up Time Constant
AI132	AO73	Ramp Down Time Constant
AI133	AO74	Discharge Ramp Up Rate
AI134	AO75	Discharge Ramp Down Rate

Input	Output	Point
AI135	AO76	Charge Ramp Up Rate
AI136	AO77	Charge Ramp Down Rate
AI137	AO78	High Return Gradient
AI138	AO79	Low Return Gradient
AI139	---	Attempted Output
AI140	AO80	Minimum Usable SOC
AI141	AO81	Maximum Usable SOC
BI86	BO34	Enable or Disable Hysteresis
BI87	BO35	Enable or Disable Snapshot of Power
BI68	BO16	Enable Mode

1. Obtain supported flag for the mode (BI35) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.4 Dynamic Reactive Current Support Mode – DRCS-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-4
Specific Test Points for Dynamic Reactive Current Support Mode

Input	Output	Point
AI83	AO32	Mode Priority
AI84	AO33	Enabling Time Window
AI85	AO34	Enabling Ramp Time
AI86	AO35	Timeout Period
AI87	AO36	Signal Meter ID
AI88	---	Voltage Reference Input
AI89	---	Moving Average Voltage
AI91	AO37	Gradient Mode
AI92	AO38	Deadband Minimum Voltage
AI93	AO39	Deadband Maximum Voltage
AI94	AO40	Gradient for Sags
AI95	AO41	Gradient for Swells
AI96	AO42	Filter Time for Moving Average Voltage
AI97	AO43	Block Zone Voltage
AI98	AO44	Hysteresis Block Zone Voltage
AI99	AO45	Block Zone Time
AI100	AO46	Hold Time
AI101	---	Current Attempted Output
BI85	BO33	Enable Event-Based Reactive Current Support
BI66	BO14	Enable Mode

1. Obtain supported flag for the mode (BI33) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.

- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.5 Dynamic Volt-Watt Mode – DVW-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-5
Specific Test Points for Dynamic Volt-Watt Mode

Input	Output	Point
AI102	AO48	Mode Priority
AI103	AO49	Enabling Time Window
AI104	AO50	Enabling Ramp Time
AI105	AO51	Timeout Period
AI106	AO52	Signal Meter ID
AI107	---	Voltage Reference Input
AI108	---	Moving Average Voltage
AI109	---	Present Delta Voltage
AI110	AO53	Gradient
AI111	AO54	Filter Time
AI112	AO55	Lower Deadband
AI113	AO56	Upper Deadband
AI114	---	Attempted Output
BI67	BO15	Enable Mode

1. Obtain supported flag for the mode (BI34) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.

6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.6 Active Power Limit Mode – APL-001

Purpose

Verify settings can be properly obtained and transmitted for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-6
Specific Test Points for Active Power Limit Mode

Input	Output	Point
AI142	AO82	Mode Priority
AI143	AO83	Enabling Time Window
AI144	AO84	Enabling Ramp Time
AI145	AO85	Reversion Timeout Period
AI146	A086	Signal Meter ID
AI147	---	Reference Input
AI148	AO87	Charge Setpoint
AI149	AO88	Generation Setpoint
BI69	BO17	Enable Mode

1. Obtain supported flag for the mode (BI36) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the Input column that are specified as supported in the PICS.
4. For all the settings in the Output column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the Input column.
6. Repeat steps 3-5 using a different set of values.

7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.7 Charge/Discharge Storage Mode – CHG-001

Purpose

Verify settings can be properly obtained and transmitted for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-7
Specific Test Points for Charge and Discharge Storage Mode

Input	Output	Point
AI150	AO89	Mode Priority
AI151	AO90	Enabling Time Window
AI152	AO91	Enabling Ramp Time
AI153	AO92	Reversion Timeout Period
AI154	AO93	Active Power Target
AI155	AO94	Ramp Up Time Constant
AI156	AO95	Ramp Down Time Constant
AI157	AO96	Discharge Ramp Up Rate
AI158	AO97	Discharge Ramp Down Rate
AI159	AO98	Charge Ramp Up Rate
AI160	AO99	Charge Ramp Down Rate
AI161	AO100	Minimum Reserve for Storage
AI162	AO101	Maximum Reserve for Storage
BI90	BO38	Use Ramp Rates
BI70	BO18	Mode Enable

1. Obtain supported flag for the mode (BI37) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.

3. Obtain the points contained in the table specified in the Input column that are specified as supported in the PICS.
4. For all the settings in the Output column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the Input column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.8 Coordinated Charge/Discharge Management Mode – CCM-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-8
Specific Test Points for Coordinated Charge and Discharge Management Mode

Input	Output	Point
AI163	AO102	Mode Priority
AI164	AO103	Enabling Time Window
AI165	AO104	Enabling Ramp Time
AI166	AO105	Reversion Timeout Period
AI167	AO106	Target State of Charge
AI168	AO107	Target Date
AI169	AO108	Target Time
AI170	AO109	Energy Request
AI171	AO110	Minimum Charging Duration
AI172	AO111	Date of Reference
AI173	AO112	Time of Reference
AI174	AO113	Duration at Maximum Charge Rate

Input	Output	Point
AI175	AO114	Duration Maximum Discharge Rate
BI71	BO18	Mode Enable

1. Obtain supported flag for the mode (BI38) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.9 Active Power Response Mode 1 – APR1-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-9
Specific Test Points for Active Power Response Mode 1

Input	Output	Point
AI176	AO115	Mode Priority
AI177	AO116	Enabling Time Window
AI178	AO117	Enabling Ramp Time
AI179	AO118	Reversion Timeout Period
AI180	AO119	Signal Meter ID
AI181	---	Reference Power Measured

Input	Output	Point
AI182	AO120	Power Threshold
AI183	AO121	Ratio
AI184	AO122	Ramp Up Rate
AI185	AO123	Ramp Down Rate
AI186	---	Attempted Output
BI72	BO20	Enable Mode

1. Obtain supported flag for the mode (BI39) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.10 Active Power Response Mode 2 – APR2-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-10
Specific Test Points for Active Power Response Mode 2

Input	Output	Point
AI187	AO124	Mode Priority
AI188	AO125	Enabling Time Window
AI189	AO126	Enabling Ramp Time
AI190	AO127	Reversion Timeout Period
AI191	AO128	Signal Meter ID
AI192	---	Reference Power Measured
AI193	AO129	Power Threshold
AI194	AO130	Ratio
AI195	AO131	Ramp Up Rate
AI196	AO132	Ramp Down Rate
AI197	---	Attempted Output
BI73	BO21	Mode Enable

1. Obtain supported flag for the mode (BI40) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.11 Active Power Response Mode 3 – APR3-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-11
Specific Test Points for Active Power Response Mode 3

Input	Output	Point
AI198	AO133	Mode Priority
AI199	AO134	Enabling Time Window
AI200	AO135	Enabling Ramp Time
AI201	AO136	Reversion Timeout Period
AI202	AO137	Signal Meter ID
AI203	---	Reference Power Measured
AI204	AO138	Power Threshold
AI205	AO139	Ratio
AI206	AO140	Ramp Up Rate
AI207	AO141	Ramp Down Rate
AI1208	---	Attempted Output
BI74	BO22	Mode Enable

1. Obtain supported flag for the mode (BI41) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.12 Automatic Generation Control Mode – AGC-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-12
Specific Test Points for Automatic Generation Control Mode

Input	Output	Point
AI209	AO142	Mode Priority
AI210	AO143	Enabling Time Window
AI211	AO144	Enabling Ramp Time
AI212	AO145	Reversion Timeout Period
AI213	AO146	Active Power Target
AI214	AO147	Time Constant Ramp Up Time
AI215	AO148	Time Constant Ramp Down Time
AI216	AO149	Discharge Ramp Up Time
AI217	AO150	Discharge Ramp Down Time
AI218	AO151	Charge Ramp Up Time
AI219	AO152	Charge Ramp Down Time
AI220	AO153	Minmum Usable SOC
AI221	AO154	Maximum Usable SOC
AI222	---	Maximum Watts Available
AI223	---	Minimum Watts Available
AI224	---	Expected State of Charge
AI225	---	Expected State of Energy
BI91	BO39	Use Ramp Rates
BI75	BO23	Enable Mode

1. Obtain supported flag for the mode (BI42) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.

7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.13 Active Power Smoothing Mode – APS-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-13
Specific Test Points for Active Power Smoothing Mode

Input	Output	Point
AI227	AO155	Mode Priority
AI228	AO156	Enabling Time Window
AI229	AO157	Enabling Ramp Time
AI230	AO158	Reversion Timeout Period
AI231	AO159	Signal Meter ID
AI232	---	Reference Power Input
AI233	AO160	Gradient
AI234	AO161	Lower Limit
AI235	AO162	Upper Limit
AI236	AO163	Filter Time
AI237	AO164	Discharge Ramp Up Ramp
AI238	AO165	Discharge Ramp Down Rate
AI239	AO166	Charge Ramp Up Rate
AI240	AO167	Charge Ramp Down Rate
AI241	---	Attempted Output
BI76	BO24	Enable Mode

1. Obtain supported flag for the mode (BI43) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.

3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.14 Volt-Watt Mode – VW-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-14
Specific Test Points for Volt-Watt Mode

Input	Output	Point
AI242	AO168	Mode Priority
AI243	AO169	Enabling Time Window
AI244	AO170	Enabling Ramp Time
AI245	AO171	Reversion Timeout Period
AI246	AO172	Signal Meter ID
AI247	---	Reference Voltage Input
AI248	AO173	Curve Index
AI249	---	Attempted Output
AI250	AO174	Filter Time
AI251	AO175	Ramp Up Time Constant
AI252	AO176	Ramp Down Time Constant
AI253	AO177	Discharging Ramp Up Rate

Input	Output	Point
AI254	AO178	Discharging Ramp Down Rate
AI255	AO179	Charging Ramp Up Rate
AI256	AO180	Charging Ramp Down Rate
BI77	BO25	Enable Mode

1. Obtain supported flag for the mode (BI44) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. Update all supported curve-based modes to a curve index of 0.
5. Select a valid curve index and prepare a set of valid curve settings.
6. For all the settings in the table that are supported, transmit valid settings to the locations contained in the *Output* column.
7. Obtain all the settings in the table specified in the *Input* column corresponding to values that were transmitted.
8. Repeat steps 4-6 using different valid settings than previously applied.
9. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 6, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 8, verify all the setting values match the second set of values previously transmitted.
- After step 9, verify mode is disabled.

5.15 Frequency-Watt Curve Mode – FWC-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-15
Specific Test Points for Frequency-Watt Curve Mode

Input	Output	Point
AI257	AO181	Mode Priority
AI258	AO182	Enabling Time Window
AI259	AO183	Enabling Ramp Time

AI260	AO184	Reversion Timeout Period
AI261	AO185	Signal Meter ID
AI262	---	Frequency Reference Input
AI263	AO186	Curve Index
AI264	AO187	High Frequency Hysteresis Curve Index
AI265	AO188	Lo Frequency Hysteresis Curve Index
AI266	AO189	Start Delay
AI267	AO190	Stop Delay
AI268	AO191	Ramp Up Time Constant
AI269	AO192	Ramp Down Time Constant
AI270	AO193	Discharge Ramp Up Rate
AI271	AO194	Discharge Ramp Down Rate
AI272	AO195	Charge Ramp Up Rate
AI273	AO196	Charge Ramp Down Rate
AI274	---	Attempted Output
AI275	AO197	Minimum Usable SOC
AI276	AO198	Maximum Usable SOC
BI88	BO36	Use Hysteresis
BI89	BO37	Snapshot of Power
BI78	BO26	Enable Mode

1. Obtain supported flag for the mode (BI45) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. Update all supported curve-based modes to a curve index of 0.
5. Select a valid curve index and prepare a set of valid curve settings.
6. For all the settings in the table that are supported, transmit valid settings to the locations contained in the *Output* column.
7. Obtain all the settings in the table specified in the *Input* column corresponding to values that were transmitted.
8. Repeat steps 4-6 using different valid settings than previously applied.
9. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.

- After step 6, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 8, verify all the setting values match the second set of values previously transmitted.
- After step 9, verify mode is disabled.

5.16 Constant Vars Mode – CVAR-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-16
Specific Test Points for Constant Vars Mode

Input	Output	Point
AI277	AO199	Mode Priority
AI278	AO200	Enabling Time Window
AI279	AO201	Enabling Ramp Time
AI280	AO202	Reversion Timeout Period
AI281	AO203	Reactive Power Target
AI282	AO203	Ramp Up Time Constant
AI283	AO205	Ramp Down Time Constant
BI28	BO9	Time Constant Mode
BI79	BO27	Enable Mode

1. Obtain supported flag for the mode (BI46) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.

- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.17 Fixed Power Factor Mode – FPF-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points.

Table 5-17
Specific Test Points for Fixed Power Factor Mode

Input	Output	Point
AI284	AO206	Mode Priority
AI285	AO207	Enabling Time Window
AI286	AO208	Enabling Ramp Time
AI287	AO209	Reversion Timeout Period
AI288	AO210	Setpoint Generation/Discharging
AI289	AO211	Setpoint Charging
BI29	BO10	Excitation Discharging/Generating
BI30	BO11	Excitation Charging
BI47	BO28	Enable Mode

1. Obtain supported flag for the mode (BI47) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.

- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.18 Volt-Var Control Mode – VV-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-18
Specific Test Points for Volt-Var Control Mode

Input	Output	Point
AI290	AO212	Mode Priority
AI291	AO213	Enabling Time Window
AI292	AO214	Enabling Ramp Time
AI293	AO215	Reversion Timeout Period
AI294	AO216	Signal Meter ID
AI295	---	Voltage Input
AI296	---	Adjusted Reference Voltage
AI297	AO217	Curve index
AI298	AO218	Ramp Up Time Constant
AI299	AO219	Ramp Down Time Constant
AI300	AO220	Autonomous Voltage Reference Time Constant
AI301	---	Attempted Output
BI48	BO29	Enable Mode

1. Obtain supported flag for the mode (BI48) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. Update all supported curve-based modes to a curve index of 0.
5. Select a valid curve index and prepare a set of valid curve settings.
6. For all the settings in the table that are supported, transmit valid settings to the locations contained in the *Output* column.

7. Obtain all the settings in the table specified in the *Input* column corresponding to values that were transmitted.
8. Repeat steps 4-6 using different valid settings than previously applied.
9. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 6, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 8, verify all the setting values match the second set of values previously transmitted.
- After step 9, verify mode is disabled.

5.19 Watt-Var Power Mode – WV-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-19
Specific Test Points for Watt-Var Power Mode

Input	Output	Point
AI302	AO221	Mode Priority
AI303	AO222	Enabling Time Window
AI304	AO223	Enabling Ramp Time
AI305	AO224	Reversion Timeout Period
AI306	AO225	Signal Meter ID
AI307	---	Reference Power Input
AI308	AO226	Curve Index
AI309	AO227	Ramp Up Time Constant
AI310	AO228	Ramp Down Time Constant
AI311	---	Attempted Output
BI49	BO30	Enable Mode

1. Obtain supported flag for the mode (BI49) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.

4. Update all supported curve-based modes to a curve index of 0.
5. Select a valid curve index and prepare a set of valid curve settings.
6. For all the settings in the table that are supported, transmit valid settings to the locations contained in the *Output* column.
7. Obtain all the settings in the table specified in the *Input* column corresponding to values that were transmitted.
8. Repeat steps 4-6 using different valid settings than previously applied.
9. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 6, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 8, verify all the setting values match the second set of values previously transmitted.
- After step 9, verify mode is disabled.

5.20 Power Factor Correction Mode – PFC-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-20
Specific Test Points for Power Factor Correction Mode

Input	Output	Point
AI312	AO229	Mode Priority
AI313	AO230	Enabling Time Window
AI314	AO231	Enabling Ramp Time
AI315	AO232	Reversion Timeout Period
AI316	AO233	Signal Meter ID
AI317	---	Reference Power Factor Input
AI318	AO234	Average PF Target
AI319	AO235	Lower PF Limit
AI320	AO236	Upper PF Limit
BI83	BO31	Enable Mode

1. Obtain supported flag for the mode (BI50) if specified as supported in the PICS.

2. If supported flag value is 0, skip subsequent test steps.
3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

5.21 Pricing Signal Mode – PSIG-001

Purpose

Verify settings can be properly obtained and updated for the mode if the mode is supported.

Procedure

The following table contains the mode specific points to be used in this test.

Table 5-21
Specific Test Points for Pricing Signal Mode

Input	Output	Point
AI321	AO237	Mode Priority
AI322	AO238	Enabling Time Window
AI323	AO239	Enabling Ramp Time
AI324	AO240	Reversion Timeout Period
AI325	AO241	Setpoint
AI326	AO242	Time Constant Ramp Up Time
AI327	AO243	Time Constant Ramp Down Time
BI84	BO32	Enable Mode

1. Obtain supported flag for the mode (BI51) if specified as supported in the PICS.
2. If supported flag value is 0, skip subsequent test steps.

3. Obtain the points contained in the table specified in the *Input* column that are specified as supported in the PICS.
4. For all the settings in the *Output* column of the table that are supported, transmit valid settings values.
5. Obtain all the corresponding analog input setting settings in the table specified in the *Input* column.
6. Repeat steps 3-5 using a different set of values.
7. Disable the mode, if enabled.

Criteria

- If supported flag value is 0 in step 2, skip the rest of the test criteria.
- After step 3, verify all the input values obtained are ONLINE.
- After step 4, verify all the setting values obtained are ONLINE and the values match the values previously transmitted.
- After step 6, verify all the setting values match the second set of values previously transmitted.
- After step 7, verify mode is disabled.

6
SCHEDULING TESTS

6.1 Schedule Mode Basic Test – SCHED-001

Purpose

Verify the ability to schedule a single supported mode if supported.

Procedure

1. Obtain the Schedule to Edit Selector (AO461) if specified as supported in the PICS.
2. If the edit selector is supported, obtain points associated with the schedule function (BI108-BI116, BO42-BO49, AI24, AI569-AI580).
3. Chose a supported curve-based mode and configure two curves with the two sets of values associated with the mode test using two curve indexes.
4. Set the schedule index (AO461) to 1.
5. Set the schedule id (AO462) to 100.
6. Set the schedule priority (AO463) to 3.
7. Set the schedule type (AO464) to the type matching the mode selected.
8. Set the schedule start day (AO465) to days since 1/1/1970 for current day + 1.
9. Set the schedule start time (AO466) to 86399999 (last msec of the day).
10. Set schedule repeat interval (AO467) to 7.
11. Set schedule repeat interval unit (AO468) to 4 (days).
12. Set schedule number of points (AO469) to 4.
13. Set curve point 1 (time offset 1) to 3600 and curve point 2 to mode first curve index.
14. Set curve point 3 (time offset 2) to 3700 and curve point 4 to mode second curve index.
15. Set selected curve schedule ready (BO42) to 1.

Criteria

- After step 1, verify Schedule to Edit Selector point is ONLINE.
- After step 2, verify all schedule associated points are ONLINE.
- Verify though the mapped AI points that all the values were set correctly and accepted.
- Verify the response for step 13 was successful indicating the schedule was accepted.

A
PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT

The Protocol Implementation Conformance Statement (PICS) is a list provided by a manufacturer to define a device's support of the various mandatory and optional parameters from the DNP Application Note AN2018-001. Supported and unsupported points must follow different pass/fail criteria. This document informs the testers which tests are required, is completed by the entity submitting their product for testing and is a key for determining systems interoperability.

This appendix contains snapshots of the full PICS developed to support testing. A copy of the excel version can be obtained through EPRI or the SunSpec Alliance.

Spreadsheet Tab Name: *Instructions*

DNP-AN2018 PICS Template

This PICS template is used to submit implementation conformance information for certification. This template can be automatically generated and populated based on the device contents by a SunSpec utility with access to the device.

The first column for each point in the point tabs (BI, BO, AI, AO, C) indicates whether the point is supported in the implementation. The 'Supported' column should be populated with a value of 'True' for all supported points. If the supported column is not set to 'True', the point is considered unsupported. The supported column is the only point information required in the PICS declaration. The other columns present in the point tabs are for information purposes only.

Prepared by

SunSpec Alliance

Agreement

EPC-15-089 – Expanding Standards and Developing Tools to Enable DNP3 Support of Storage Use Cases

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Spreadsheet Tab Name: ***Certification Info***

Date	
Manufacturer Name	
Product Name	
Product Models	
Product Description	

Spreadsheet Tab Name: ***Testing Info***

Submitter	
Email	
Phone	
Interface Information	

Spreadsheet Tabg4 Name: *BI*

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
BI0	System Communication Error										
BI1	System Has Priority 1 Alarms										
BI2	System Has Priority 2 Alarms										
BI3	System Has Priority 3 Alarms										
BI4	Storage State of Charge at Maximum										
BI5	Storage State of Charge is Too High										
BI6	Storage State of Charge is Too Low										
BI7	Storage State of Charge is Depleted										
BI8	Storage Internal Temperature is Too High										
BI9	Storage External (Ambient) Temperature is Too High										
BI10	System Is In Local State										
BI11	System Is In Lockout State					BO0					
BI12	System Is Starting Up										
BI13	System Is Stopping										
BI14	System is Started (Return to Service)					BO1					
BI15	System is Stopped (Cease to Energize)					BO2					
BI16	System Permission to Start Status					BO3					
BI17	System Permission to Stop Status					BO4					
BI18	DER is Connected and Idle										
BI19	DER is Connected and Generating										
BI20	DER is Connected and Charging										
BI21	DER is Off but Available to Start										
BI22	DER is Off and Not Available to Start										
BI23	DER Connect/Disconnect Switch Closed Status					BO5					
BI24	DER Connect/Disconnect Switch Movement Status										
BI25	Islanded Mode					BO6					
BI26	Sensed Grid Config Detection Enabled					BO7					
BI27	Storage Capacity Units					BO8					
BI28	Time Constant Mode					BO9					
BI29	Power Factor Excitation When Discharging / Generating					BO10					
BI30	Power Factor Excitation When Charging					BO11					
BI31	Supports Low/High Voltage Ride-Through Mode										
BI32	Supports Low/High Frequency Ride-Through Mode										
BI33	Supports Dynamic Reactive Current Support Mode										
BI34	Supports Dynamic Volt-Watt Mode										
BI35	Supports Frequency-Watt Mode										
BI36	Supports Active Power Limit Mode										
BI37	Supports Charge/Discharge Mode										
BI38	Supports Coordinated Charge/Discharge Mode										
BI39	Supports Active Power Response Mode #1										
BI40	Supports Active Power Response Mode #2										
BI41	Supports Active Power Response Mode #3										
BI42	Supports Automatic Generation Control Mode										
BI43	Supports Active Power Smoothing Mode										
BI44	Supports Volt-Watt Mode										
BI45	Supports Frequency-Watt Curve Mode										
BI46	Supports Constant VArs Mode										
BI47	Supports Fixed Power Factor Mode										
BI48	Supports Volt-VAr Control Mode										
BI49	Supports Watt-VAr Mode										
BI50	Supports Power Factor Correction Mode										
BI51	Supports Pricing Mode										
BI52	Overvoltage Disconnect Protection Blocked										
BI53	Overvoltage Disconnect Protection Started										
BI54	Overvoltage Disconnect Protection Operated										
BI55	Undervoltage Disconnect Protection Blocked										

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
BI56	Undervoltage Disconnect Protection Started										
BI57	Undervoltage Disconnect Protection Operated										
BI58	Over Frequency Disconnect Protection Blocked										
BI59	Over Frequency Disconnect Protection Started										
BI60	Over Frequency Disconnect Protection Operated										
BI61	Under Frequency Disconnect Protection Blocked										
BI62	Under Frequency Disconnect Protection Started										
BI63	Under Frequency Disconnect Protection Operated										
BI64	Operating Mode - Low/High Voltage Ride-Through					BO12					
BI65	Operating Mode - Low/High Frequency Ride-Through					BO13					
BI66	Operating Mode - Dynamic Reactive Current Support Enabled					BO14					
BI67	Operating Mode - Dynamic Volt-Watt Enabled					BO15					
BI68	Operating Mode - Frequency-Watt Enabled					BO16					
BI69	Operating Mode - Active Power Limit Enabled					BO17					
BI70	Operating Mode - Charge/Discharge Enabled					BO18					
BI71	Operating Mode - Coordinated Charge / Discharge Management Enabled					BO19					
BI72	Operating Mode - Active Power Response Mode #1 Enabled					BO20					
BI73	Operating Mode - Active Power Response Mode #2 Enabled					BO21					
BI74	Operating Mode - Active Power Response Mode #3 Enabled					BO22					
BI75	Operating Mode - Automatic Generation Control Enabled					BO23					
BI76	Operating Mode - Active Power Smoothing Enabled					BO24					
BI77	Operating Mode - Volt-Watt Enabled					BO25					
BI78	Operating Mode - Frequency-Watt Curve Enabled					BO26					
BI79	Operating Mode - Constant VArs Enabled					BO27					
BI80	Operating Mode - Fixed Power Factor Enabled					BO28					
BI81	Operating Mode - Volt-VAR Control Enabled					BO29					
BI82	Operating Mode - Watt-VAr Enabled					BO30					
BI83	Operating Mode - Power Factor Correction Enabled					BO31					
BI84	Operating Mode - Pricing Enabled					BO32					
BI85	Operating Mode - Event-Based Reactive Current Support Enabled					BO33					
BI86	Frequency-Watt Mode - Use Hysteresis					BO34					
BI87	Frequency-Watt Mode - Snapshot of Power					BO35					
BI88	Frequency-Watt Curve Mode - Use Hysteresis					BO36					
BI89	Frequency-Watt Curve Mode - Snapshot of Power					BO37					
BI90	Charge/Discharge Mode - Use Ramp Rates					BO38					
BI91	AGC Mode - Use Ramp Rates					BO39					
BI92	Volt-Watt - Use Ramp Rates and Time Constants					BO40					
BI93	Volt-VAr Enable Autonomous Voltage Reference Adjustment					BO41					
BI94	System Meter Active Power is Too High										
BI95	System Meter Active Power is Too Low										
BI96	System Meter Reactive Power is Too High										
BI97	System Meter Reactive Power is Too Low										
BI98	System Meter Power Factor is Too High										
BI99	System Meter Power Factor is Too Low										
BI100	System Meter Phase A Voltage is Too High										
BI101	System Meter Phase A Voltage is Too Low										
BI102	System Meter Phase B Voltage is Too High										
BI103	System Meter Phase B Voltage is Too Low										
BI104	System Meter Phase C Voltage is Too High										
BI105	System Meter Phase C Voltage is Too Low										
BI106	System Meter Communication Error										
BI107	Selected Curve is Referenced by a Mode										
BI108	Selected Schedule is Ready					BO42					
BI109	Selected Schedule is Validated										
BI110	Selected Schedule Repeat Weekly Sunday					BO43					
BI111	Selected Schedule Repeat Weekly Monday					BO44					
BI112	Selected Schedule Repeat Weekly Tuesday					BO45					
BI113	Selected Schedule Repeat Weekly Wednesday					BO46					
BI114	Selected Schedule Repeat Weekly Thursday					BO47					
BI115	Selected Schedule Repeat Weekly Friday					BO48					
BI116	Selected Schedule Repeat Weekly Saturday					BO49					

Spreadsheet Tab Name: *BO*

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
BO0	System Set Lockout State					BI11					
BO1	System Initiate Start-up Sequence (Return to Service)					BI14					
BO2	System Execute Stop (Cease to Energize)					BI15					
BO3	System Permission to Start					BI16					
BO4	System Permission to Stop					BI17					
BO5	DER Connect/Disconnect Switch					BI23					
BO6	Islanded Mode					BI25					
BO7	Enable Sensed Grid Config Detection					BI26					
BO8	Storage Capacity Units					BI27					
BO9	Time Constant Mode					BI28					
BO10	Power Factor Excitation When Discharging/Generating					BI29					
BO11	Power Factor Excitation When Charging					BI30					
BO12	Enable Low/High Voltage Ride-Through Mode					BI64					
BO13	Enable Low/High Frequency Ride-Through Mode					BI65					
BO14	Enable Dynamic Reactive Current Support Mode					BI66					
BO15	Enable Dynamic Volt-Watt Mode					BI67					
BO16	Enable Frequency-Watt Mode					BI68					
BO17	Enable Active Power Limit Mode					BI69					
BO18	Enable Charge/Discharge Mode					BI70					
BO19	Enable Coordinated Charge/Discharge Mode					BI71					
BO20	Enable Active Power Response Mode #1					BI72					
BO21	Enable Active Power Response Mode #2					BI73					
BO22	Enable Active Power Response Mode #3					BI74					
BO23	Enable Automatic Generation Control Mode					BI75					
BO24	Enable Active Power Smoothing Mode					BI76					
BO25	Enable Volt-Watt Mode					BI77					
BO26	Enable Frequency-Watt Curve Mode					BI78					
BO27	Enable Constant VArs Mode					BI79					
BO28	Enable Fixed Power Factor Mode					BI80					
BO29	Enable Volt-VAR Control Mode					BI81					
BO30	Enable Watt-VAr Mode					BI82					
BO31	Enable Power Factor Correction Mode					BI83					
BO32	Enable Pricing Mode					BI84					
BO33	Enable Event-Based Reactive Current Support Mode, in which the moving average voltage and the base reactive current are frozen until after the voltage has returned to within the deadband for a specified hold time					BI85					
BO34	Frequency-Watt Mode - Use Hysteresis					BI86					
BO35	Frequency-Watt Mode - Snapshot of Power					BI87					
BO36	Frequency-Watt Curve Mode - Use Hysteresis					BI88					
BO37	Frequency-Watt Curve Mode - Snapshot of Power					BI89					
BO38	Charge/Discharge Mode - Use Ramp Rates					BI90					
BO39	AGC Mode - Use Ramp Rates					BI91					
BO40	Volt-Watt - Use Ramp Rates and Time Constants					BI92					
BO41	Volt-VAr Enable Autonomous Voltage Reference Adjustment					BI93					
BO42	Selected Schedule is Ready					BI108					
BO43	Selected Schedule Repeat Weekly Sunday					BI110					
BO44	Selected Schedule Repeat Weekly Monday					BI111					
BO45	Selected Schedule Repeat Weekly Tuesday					BI112					
BO46	Selected Schedule Repeat Weekly Wednesday					BI113					
BO47	Selected Schedule Repeat Weekly Thursday					BI114					
BO48	Selected Schedule Repeat Weekly Friday					BI115					
BO49	Selected Schedule Repeat Weekly Saturday					BI116					

Spreadsheet Tab Name: *AI*

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI0	DER Profile Version Number								0.01		
AI1	DER Profile Implementation Level								1		
AI2	Nameplate Minimum Voltage Rating								0.1		
AI3	Nameplate Maximum Voltage Rating								0.1		
AI4	Nameplate Active Generation Power Rating at Unity Power Factor								1		
AI5	Nameplate Active Charging Power Rating at Unity Power Factor								1		
AI6	Nameplate Active Generation Power Rating at Specified Over-Excited Power Factor								1		
AI7	Nameplate Active Charging Power Rating at Specified Over-Excited Power Factor								1		
AI8	Specified Over-Excited Power Factor								0.01		
AI9	Nameplate Active Generation Power Rating at Specified Under-Excited Power Factor								1		
AI10	Nameplate Active Charging Power Rating at Specified Under-Excited Power Factor								1		
AI11	Specified Under-Excited Power Factor								0.01		
AI12	Nameplate Reactive Supply (Injection) Power Rating								1		
AI13	Nameplate Reactive Absorption Power Rating								1		
AI14	Nameplate Apparent Generation Power Rating								1		
AI15	Nameplate Apparent Charging Power Rating								1		
AI16	Nameplate Storage Actual Energy Capacity								1		
AI17	Storage Effective Actual Energy Capacity								1		
AI18	Storage Usable Energy Capacity								1		
AI19	Nameplate AC Current Maximum Generation Rating								0.1		
AI20	Nameplate AC Current Maximum Charging Rating								0.1		
AI21	Remaining Reactive Susceptance								1		
AI22	IEEE 1547 Normal Operating Performance Category								1		
AI23	IEEE 1547 Abnormal Operating Performance Category								1		
AI24	Number of System Schedules								1		
AI25	Number of Meters								1		
AI26	Number of Inverters								1		
AI27	Number of Batteries								1		
AI28	Number of DER units connected to controller								1		
AI29	Reference Voltage					AO0			0.1		
AI30	Reference Voltage Offset					AO1			0.1		
AI31	Nominal Grid Frequency					AO2			0.001		
AI32	Maximum Active Generation Power								1		
AI33	Maximum Active Charging Power								1		
AI34	Maximum Reactive Injection Power								1		
AI35	Maximum Reactive Absorption Power								1		
AI36	Maximum Apparent Generation Power								1		
AI37	Maximum Apparent Charging Power								1		
AI38	Minimum Voltage								0.1		
AI39	Maximum Voltage								0.1		
AI40	Open Loop Response Time Percentage								0.1		
AI41	Power Factor Sign Convention:					AO4			1		
AI42	Reference for Reactive Power Setpoints								1		
AI43	System Available Active Generation Power								1		
AI44	System Available Active Charging Power								1		
AI45	System Available Reactive Injection Power								1		

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI46	System Available Reactive Absorption Power								1		
AI47	System Available Actual State of Charge Present energy in the DER as a percentage of Storage Effective Actual Capacity								0.1		
AI48	System Usable State of Charge Present usable energy in the DER as a percentage of Nameplate Storage Usable Capacity								0.1		
AI49	System Start-up Status								1		
AI50	DER Start (Return to Service) Voltage High Limit					AO6			0.01		
AI51	DER Start (Return to Service) Voltage Low Limit					AO7			0.01		
AI52	DER Start (Return to Service) Frequency High Limit					AO8			0.001		
AI53	DER Start (Return to Service) Frequency Low Limit					AO9			0.001		
AI54	DER Start (Return to Service) Delay								1		
AI55	DER Start (Return to Service) Time Window								1		
AI56	DER Start (Return to Service) Ramp Up Time					AO12			1		
AI57	DER Stop (Cease to Energize) Time Window								1		
AI58	DER Stop (Cease to Energize) Ramp Down Time					AO14			1		
AI59	DER Stop (Cease to Energize) Reversion Timeout Period								1		
AI60	Connect/Disconnect Time Window					AO16			1		
AI61	Connect/Disconnect Reversion Timeout Period					AO17			1		
AI62	Maximum Generation Ramp Up Rate								0.1		
AI63	Maximum Generation Ramp Down Rate								0.1		
AI64	Maximum Charging Ramp Up Rate								0.1		
AI65	Maximum Charging Ramp Down Rate								0.1		
AI66	Requested Settings Group								1		
AI67	Settings Group Being Edited								1		
AI68	Active Settings Group								1		
AI69	Freeze Counter Interval								1		
AI70	Freeze Counter Interval Units					AO21			1		
AI71	Low/High Voltage Ride-Through Signal Meter ID								1		
AI72	Low/High Voltage Ride-Through Voltage Reference Input								0.1		
AI73	Low/High Voltage Ride-Through High Must Trip Curve Index								1		
AI74	Low/High Voltage Ride-Through Low Must Trip Curve Index								1		
AI75	Low/High Voltage Ride-Through High Momentary Cessation Curve Index					AO25			1		
AI76	Low/High Voltage Ride-Through Low Momentary Cessation Curve Index					AO26			1		
AI77	Low/High Frequency Ride-Through Signal Meter ID								1		
AI78	Low/High Frequency Ride-Through Frequency Reference Input								0.1		
AI79	Low/High Frequency Ride-Through High Must Trip Curve Index								1		
AI80	Low/High Frequency Ride-Through Low Must Trip Curve Index								1		
AI81	Low/High Frequency Ride-Through High Momentary Cessation Curve Index					AO30			1		
AI82	Low/High Frequency Ride-Through Low Momentary Cessation Curve Index					AO31			1		
AI83	Dynamic Reactive Current Support Mode Priority					AO32			1		
AI84	Dynamic Reactive Current Support Enabling Time Window					AO33			1		
AI85	Dynamic Reactive Current Support Enabling Ramp Time					AO34			1		
AI86	Dynamic Reactive Current Support Timeout Period					AO35			1		
AI87	Dynamic Reactive Current Support Signal Meter ID								1		
AI88	Dynamic Reactive Current Support Voltage Reference Input								0.1		
AI89	Dynamic Reactive Current Support Moving Average Voltage								0.1		
AI90	Dynamic Reactive Current Support Present Delta Voltage								0.1		
AI91	Dynamic Reactive Current Support - Gradient Mode					AO37			1		
AI92	Dynamic Reactive Current Support Deadband Minimum Voltage					AO38			0.1		
AI93	Dynamic Reactive Current Support Deadband Maximum Voltage					AO39			0.1		
AI94	Dynamic Reactive Current Support Gradient for Sags					AO40			0.001		
AI95	Dynamic Reactive Current Support Gradient for Swells					AO41			0.001		

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI96	Dynamic Reactive Current Support Filter Time for Moving Average Voltage (RDGS					AO42			1		
AI97	Dynamic Reactive Current Support Block Zone Voltage					AO43			0.1		
AI98	Dynamic Reactive Current Support Hysteresis Block Zone Voltage					AO44			0.1		
AI99	Dynamic Reactive Current Support Block Zone Time					AO45			1		
AI100	Dynamic Reactive Current Support Hold Time					AO47			1		
AI101	Dynamic Reactive Current Attempted Output								0.1		
AI102	Dynamic Volt-Watt Mode Priority					AO48			1		
AI103	Dynamic Volt-Watt Enabling Time Window					AO49			1		
AI104	Dynamic Volt-Watt Enabling Ramp Time					AO50			1		
AI105	Dynamic Volt-Watt Reversion Timeout Period					AO51			1		
AI106	Dynamic Volt-Watt Signal Meter ID								1		
AI107	Dynamic Volt-Watt Voltage Reference Input								0.1		
AI108	Dynamic Volt-Watt Moving Average Voltage								0.1		
AI109	Dynamic Volt-Watt Present Delta Voltage								0.1		
AI110	Dynamic Volt-Watt Gradient					AO53			0.001		
AI111	Dynamic Volt-Watt Filter Time					AO54			1		
AI112	Dynamic Volt-Watt Lower Deadband					AO55			0.1		
AI113	Dynamic Volt-Watt Upper Deadband					AO56			0.1		
AI114	Dynamic Volt-Watt Attempted Output								1		
AI115	Frequency-Watt Mode Priority					AO57			1		
AI116	Frequency-Watt Enabling Time Window								1		
AI117	Frequency-Watt Enabling Ramp Time								1		
AI118	Frequency-Watt Reversion Timeout Period								1		
AI119	Frequency-Watt Signal Meter ID								1		
AI120	Frequency-Watt Frequency Reference Input								0.001		
AI121	Frequency-Watt High Starting Frequency								0.001		
AI122	Frequency-Watt High Stopping Frequency								0.001		
AI123	Frequency-Watt High Discharging / Generating Gradient					AO64			0.001		
AI124	Frequency-Watt High Charging Gradient					AO65			0.001		
AI125	Frequency-Watt Low Starting Frequency								0.001		
AI126	Frequency-Watt Low Stopping Frequency								0.001		
AI127	Frequency-Watt Low Discharging / Generating Gradient					AO68			0.001		
AI128	Frequency-Watt Low Charging Gradient					AO69			0.001		
AI129	Frequency-Watt Start Delay					AO70			1		
AI130	Frequency-Watt Stop Delay					AO71			1		
AI131	Frequency-Watt Ramp Up Time Constant								1		
AI132	Frequency-Watt Ramp Down Time Constant								1		
AI133	Frequency-Watt Discharge Ramp Up Rate								0.1		
AI134	Frequency-Watt Discharge Ramp Down Rate								0.1		
AI135	Frequency-Watt Charge Ramp Up Rate								0.1		
AI136	Frequency-Watt Charge Ramp Down Rate								0.1		
AI137	Frequency-Watt High Return Gradient								0.1		
AI138	Frequency-Watt Low Return Gradient								0.1		
AI139	Frequency-Watt Attempted Output								1		
AI140	Frequency-Watt Minimum Usable SOC								0.1		
AI141	Frequency-Watt Maximum Usable SOC								0.1		
AI142	Active Power Limit Mode Priority					AO82			1		
AI143	Active Power Limit Enabling Time Window					AO83			1		
AI144	Active Power Limit Enabling Ramp Time					AO84			1		
AI145	Active Power Limit Reversion Timeout Period					AO85			1		
AI146	Active Power Limit Signal Meter ID								1		
AI147	Active Power Limit Reference Input								1		
AI148	Active Power Limit Charge Setpoint					AO87			0.1		
AI149	Active Power Limit Generation Setpoint					AO88			0.1		
AI150	Charge/Discharge Mode Priority					AO89			1		

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI151	Charge/Discharge Enabling Time Window					AO90			1		
AI152	Charge/Discharge Enabling Ramp Time					AO91			1		
AI153	Charge/Discharge Reversion Timeout Period					AO92			1		
AI154	Charge/Discharge Active Power Target					AO93			0.1		
AI155	Charge/Discharge Ramp Up Time Constant								1		
AI156	Charge/Discharge Ramp Down Time Constant								1		
AI157	Charge/Discharge Discharge Ramp Up Rate								0.1		
AI158	Charge/Discharge Discharge Ramp Down Rate								0.1		
AI159	Charge/Discharge Charge Ramp Up Rate								0.1		
AI160	Charge/Discharge Charge Ramp Down Rate								0.1		
AI161	Charge/Discharge Minimum Reserve for Storage					AO100			0.1		
AI162	Charge/Discharge Maximum Reserve for Storage					AO101			0.1		
AI163	Coordinated Charge/Discharge Mode Priority					AO102			1		
AI164	Coordinated Charge/Discharge Enabling Time Window					AO103			1		
AI165	Coordinated Charge/Discharge Enabling Ramp Time					AO104			1		
AI166	Coordinated Charge/Discharge Reversion Timeout Period					AO105			1		
AI167	Coordinated Charge/Discharge Target State of Charge					AO106			0.1		
AI168	Coordinated Charge/Discharge Target Date								1		
AI169	Coordinated Charge/Discharge Target Time					AO108			1		
AI170	Coordinated Charge/Discharge Energy Request					AO109			1		
AI171	Coordinated Charge/Discharge Minimum Charging Duration					AO110			1		
AI172	Coordinated Charge/Discharge Date of Reference					AO111			1		
AI173	Coordinated Charge/Discharge Time of Reference					AO112			1		
AI174	Coordinated Charge/Discharge Duration at Maximum Charge Rate					AO113			1		
AI175	Coordinated Charge/Discharge Duration Maximum Discharge Rate					AO114			1		
AI176	Active Power Response Mode #1 Priority					AO115			1		
AI177	Active Power Response Mode #1 Enabling Time Window					AO116			1		
AI178	Active Power Response Mode #1 Enabling Ramp Time					AO117			1		
AI179	Active Power Response Mode #1 Reversion Timeout Period					AO118			1		
AI180	Active Power Response Mode #1 Signal Meter ID								1		
AI181	Active Power Response Mode #1 Reference Power Measured								1		
AI182	Active Power Response Mode #1 Power Threshold					AO120			1		
AI183	Active Power Response Mode #1 Ratio					AO121			0.1		
AI184	Active Power Response Mode #1 Ramp Up Rate					AO122			0.1		
AI185	Active Power Response Mode #1 Ramp Down Rate					AO123			0.1		
AI186	Active Power Response Mode #1 Attempted Output								1		
AI187	Active Power Response Mode #2 Priority					AO124			1		
AI188	Active Power Response Mode #2 Enabling Time Window					AO125			1		
AI189	Active Power Response Mode #2 Enabling Ramp Time					AO126			1		
AI190	Active Power Response Mode #2 Reversion Timeout Period					AO127			1		
AI191	Active Power Response Mode #2 Signal Meter ID								1		
AI192	Active Power Response Mode #2 Reference Power Measured								1		
AI193	Active Power Response Mode #2 Power Threshold					AO129			1		
AI194	Active Power Response Mode #2 Ratio					AO130			0.1		
AI195	Active Power Response Mode #2 Ramp Up Rate					AO131			0.1		
AI196	Active Power Response Mode #2 Ramp Down Rate					AO132			0.1		
AI197	Active Power Response Mode #2 Attempted Output								1		
AI198	Active Power Response Mode #3 Priority					AO133			1		
AI199	Active Power Response Mode #3 Enabling Time Window					AO134			1		
AI200	Active Power Response Mode #3 Enabling Ramp Time					AO135			1		
AI201	Active Power Response Mode #3 Reversion Timeout Period					AO136			1		
AI202	Active Power Response Mode #3 Signal Meter ID								1		
AI203	Active Power Response Mode #3 Reference Power Measured								1		
AI204	Active Power Response Mode #3 Power Threshold					AO138			1		
AI205	Active Power Response Mode #3 Ratio					AO139			0.1		

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI206	Active Power Response Mode #3 Ramp Up Rate					AO140			0.1		
AI207	Active Power Response Mode #3 Ramp Down Rate					AO141			0.1		
AI208	Active Power Response Mode #3 Attempted Output								1		
AI209	AGC Mode Priority					AO142			1		
AI210	AGC Enabling Time Window					AO143			1		
AI211	AGC Enabling Ramp Time					AO144			1		
AI212	AGC Reversion Timeout Period					AO145			1		
AI213	AGC Active Power Target					AO146			1		
AI214	AGC Ramp Up Time Constant								1		
AI215	AGC Ramp Down Time Constant								1		
AI216	AGC Discharge Ramp Up Rate								0.1		
AI217	AGC Discharge Ramp Down Rate								0.1		
AI218	AGC Charge Ramp Up Rate								0.1		
AI219	AGC Charge Ramp Down Rate								0.1		
AI220	AGC Minimum Usable SOC					AO153			0.1		
AI221	AGC Maximum Usable SOC					AO154			0.1		
AI222	AGC Maximum Watts Available								1		
AI223	AGC Minimum Watts Available								1		
AI224	AGC Expected State of Charge								0.1		
AI225	AGC Expected State of Energy								0.1		
AI226	AGC Expected State of Charge Time Interval								1		
AI227	Active Power Smoothing Mode Priority					AO155			1		
AI228	Active Power Smoothing Enabling Time Window					AO156			1		
AI229	Active Power Smoothing Enabling Ramp Time					AO157			1		
AI230	Active Power Smoothing Reversion Timeout Period					AO158			1		
AI231	Active Power Smoothing Signal Meter ID								1		
AI232	Active Power Smoothing Reference Power Input								1		
AI233	Active Power Smoothing Gradient					AO160			0.001		
AI234	Active Power Smoothing Lower Limit					AO161			1		
AI235	Active Power Smoothing Upper Limit					AO162			1		
AI236	Active Power Smoothing Filter Time (Seconds)					AO163			1		
AI237	Active Power Smoothing Discharge Ramp Up Rate								0.1		
AI238	Active Power Smoothing Discharge Ramp Down Rate								0.1		
AI239	Active Power Smoothing Charge Ramp Up Rate								0.1		
AI240	Active Power Smoothing Charge Ramp Down Rate								0.1		
AI241	Active Power Smoothing Attempted Output								1		
AI242	Volt-Watt Mode Priority					AO168			1		
AI243	Volt-Watt Enabling Time Window					AO169			1		
AI244	Volt-Watt Enabling Ramp Time					AO170			1		
AI245	Volt-Watt Reversion Timeout Period					AO171			1		
AI246	Volt-Watt Signal Meter ID								1		
AI247	Volt-Watt Reference Voltage Input								0.1		
AI248	Volt-Watt Curve Index					AO173			1		
AI249	Volt-Watt Attempted Output								1		
AI250	Volt-Watt Filter Time (Seconds)					AO174			1		
AI251	Volt-Watt Ramp Up Time Constant								1		
AI252	Volt-Watt Ramp Down Time Constant								1		
AI253	Volt-Watt Discharging Ramp Up Rate								0.1		
AI254	Volt-Watt Discharging Ramp Down Rate								0.1		
AI255	Volt-Watt Charging Ramp Up Rate								0.1		
AI256	Volt-Watt Charging Ramp Down Rate								0.1		
AI257	Frequency-Watt Curve Mode Priority					AO181			1		
AI258	Frequency-Watt Curve Enabling Time Window					AO182			1		
AI259	Frequency-Watt Curve Enabling Ramp Time					AO183			1		
AI260	Frequency-Watt Curve Reversion Timeout Period					AO184			1		

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI261	Frequency-Watt Curve Signal Meter ID								1		
AI262	Frequency-Watt Curve Frequency Reference Input								0.001		
AI263	Frequency-Watt Curve - Curve Index					AO186			1		
AI264	Frequency-Watt Curve - High Frequency Hysteresis Curve Index					AO187			1		
AI265	Frequency-Watt Curve - Low Frequency Hysteresis Curve Index					AO188			1		
AI266	Frequency-Watt Curve Start Delay					AO189			1		
AI267	Frequency-Watt Curve Stop Delay					AO190			1		
AI268	Frequency-Watt Curve Ramp Up Time Constant								1		
AI269	Frequency-Watt Curve Ramp Down Time Constant					AO192			1		
AI270	Frequency-Watt Curve Discharge Ramp Up Rate					AO193			0.1		
AI271	Frequency-Watt Curve Discharge Ramp Down Rate					AO194			0.1		
AI272	Frequency-Watt Curve Charge Ramp Up Rate					AO195			0.1		
AI273	Frequency-Watt Curve Charge Ramp Down Rate					AO196			0.1		
AI274	Frequency-Watt Attempted Output								1		
AI275	Frequency-Watt Curve Minimum Usable SOC					AO197			0.1		
AI276	Frequency-Watt Curve Maximum Usable SOC					AO198			0.1		
AI277	Constant VArs Mode Priority					AO199			1		
AI278	Constant VArs Enabling Time Window					AO200			1		
AI279	Constant VArs Enabling Ramp Time					AO201			1		
AI280	Constant VArs Reversion Timeout Period					AO202			1		
AI281	Constant VArs Reactive Power Target					AO203			0.1		
AI282	Constant VArs Ramp Up Time Constant								1		
AI283	Constant VArs Ramp Down Time Constant					AO205			1		
AI284	Fixed Power Factor Mode Priority					AO206			1		
AI285	Fixed Power Factor Enabling Time Window					AO207			1		
AI286	Fixed Power Factor Enabling Ramp Time					AO208			1		
AI287	Fixed Power Factor Reversion Timeout Period					AO209			1		
AI288	Fixed Power Factor Setpoint - Generation / Discharging					AO210			0.01		
AI289	Fixed Power Factor Setpoint - Charging					AO211			0.01		
AI290	Volt-Var Control Mode Priority					AO212			1		
AI291	Volt-VAr Control Enabling Time Window					AO213			1		
AI292	Volt-VAr Control Enabling Ramp Time					AO214			1		
AI293	Volt-VAr Control Reversion Timeout Period					AO215			1		
AI294	Volt-VAr Control Signal Meter ID								1		
AI295	Volt-VAr Control Voltage Input								0.1		
AI296	Volt-VAr Control Adjusted Voltage Reference								0.1		
AI297	Volt-VAr Curve Index					AO217			1		
AI298	Volt-VAr Ramp Up Time Constant								1		
AI299	Volt-VAr Ramp Down Time Constant					AO219			1		
AI300	Volt-VAr Autonomous Voltage Reference Adjustment Time Constant					AO220			1		
AI301	Volt-VAr Attempted Output								1		
AI302	Watt-VAr Mode Priority					AO221			1		
AI303	Watt-VAr Enabling Time Window					AO222			1		
AI304	Watt-VAr Enabling Ramp Time					AO223			1		
AI305	Watt-VAr Reversion Timeout Period					AO224			1		
AI306	Watt-VAr Signal Meter ID								1		
AI307	Watt-VAr Reference Power Input								1		
AI308	Watt-VAr Curve Index					AO226			1		
AI309	Watt-VAr Ramp Up Time Constant								1		
AI310	Watt-VAr Ramp Down Time Constant					AO228			1		
AI311	Watt-VAr Attempted Output								1		
AI312	Power Factor Correction Mode Priority					AO229			1		
AI313	Power Factor Correction Enabling Time Window					AO230			1		
AI314	Power Factor Correction Enabling Ramp Time								1		
AI315	Power Factor Correction Reversion Timeout Period					AO232			1		
AI316	Power Factor Correction Signal Meter ID								1		
AI317	Power Factor Correction Reference Power Factor Input								0.01		
AI318	Power Factor Correction Average PF Target					AO234			0.01		
AI319	Power Factor Correction Lower PF Limit								0.01		
AI320	Power Factor Correction Upper PF Limit					AO236			0.01		

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI321	Pricing Mode Priority					AO237			1		
AI322	Pricing Mode Enabling Time Window					AO238			1		
AI323	Pricing Mode Enabling Ramp Time					AO239			1		
AI324	Pricing Mode Reversion Timeout Period					AO240			1		
AI325	Pricing Mode Setpoint: Hundredths of local currency per Kilowatt-Hr					AO241			0.01		
AI326	Pricing Mode Ramp Up Time Constant					AO242			1		
AI327	Pricing Mode Ramp Down Time Constant					AO243			1		
AI328	Curve Edit Selector					AO244			1		
AI329	Curve Mode Type					AO245			1		
AI330	Curve Number of Points					AO246			1		
AI331	Independent (X-Value) Units for Curve					AO247			1		
AI332	Dependent (Y-Value) Units for Curve					AO248			1		
AI333	Curve Point 1 X-Value					AO249					
AI334	Curve Point 1 Y-Value					AO250					
AI335	Curve Point 2 X-Value					AO251					
AI336	Curve Point 2 Y-Value					AO252					
AI337	Curve Point 3 X-Value					AO253					
AI338	Curve Point 3 Y-Value					AO254					
AI339	Curve Point 4 X-Value					AO255					
AI340	Curve Point 4 Y-Value					AO256					
AI341	Curve Point 5 X-Value					AO257					
AI342	Curve Point 5 Y-Value					AO258					
AI343	Curve Point 6 X-Value					AO259					
AI344	Curve Point 6 Y-Value					AO260					
AI345	Curve Point 7 X-Value					AO261					
AI346	Curve Point 7 Y-Value					AO262					
AI347	Curve Point 8 X-Value					AO263					
AI348	Curve Point 8 Y-Value					AO264					
AI349	Curve Point 9 X-Value					AO265					
AI350	Curve Point 9 Y-Value					AO266					
AI351	Curve Point 10 X-Value					AO267					
AI352	Curve Point 10 Y-Value					AO268					
AI353	Curve Point 11 X-Value					AO269					
AI354	Curve Point 11 Y-Value					AO270					
AI355	Curve Point 12 X-Value					AO271					
AI356	Curve Point 12 Y-Value					AO272					
AI357	Curve Point 13 X-Value					AO273					
AI358	Curve Point 13 Y-Value					AO274					
AI359	Curve Point 14 X-Value					AO275					
AI360	Curve Point 14 Y-Value					AO276					
AI361	Curve Point 15 X-Value					AO277					
AI362	Curve Point 15 Y-Value					AO278					
AI363	Curve Point 16 X-Value					AO279					
AI364	Curve Point 16 Y-Value					AO280					
AI365	Curve Point 17 X-Value					AO281					
AI366	Curve Point 17 Y-Value					AO282					
AI367	Curve Point 18 X-Value					AO283					
AI368	Curve Point 18 Y-Value					AO284					
AI369	Curve Point 19 X-Value					AO285					
AI370	Curve Point 19 Y-Value					AO286					
AI371	Curve Point 20 X-Value					AO287					
AI372	Curve Point 20 Y-Value					AO288					
AI373	Curve Point 21 X-Value					AO289					
AI374	Curve Point 21 Y-Value					AO290					
AI375	Curve Point 22 X-Value					AO291					
AI376	Curve Point 22 Y-Value					AO292					
AI377	Curve Point 23 X-Value					AO293					
AI378	Curve Point 23 Y-Value					AO294					
AI379	Curve Point 24 X-Value					AO295					
AI380	Curve Point 24 Y-Value					AO296					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI381	Curve Point 25 X-Value					AO297					
AI382	Curve Point 25 Y-Value					AO298					
AI383	Curve Point 26 X-Value					AO299					
AI384	Curve Point 26 Y-Value					AO300					
AI385	Curve Point 27 X-Value					AO301					
AI386	Curve Point 27 Y-Value					AO302					
AI387	Curve Point 28 X-Value					AO303					
AI388	Curve Point 28 Y-Value					AO304					
AI389	Curve Point 29 X-Value					AO305					
AI390	Curve Point 29 Y-Value					AO306					
AI391	Curve Point 30 X-Value					AO307					
AI392	Curve Point 30 Y-Value					AO308					
AI393	Curve Point 31 X-Value					AO309					
AI394	Curve Point 31 Y-Value					AO310					
AI395	Curve Point 32 X-Value					AO311					
AI396	Curve Point 32 Y-Value					AO312					
AI397	Curve Point 33 X-Value					AO313					
AI398	Curve Point 33 Y-Value					AO314					
AI399	Curve Point 34 X-Value					AO315					
AI400	Curve Point 34 Y-Value					AO316					
AI401	Curve Point 35 X-Value					AO317					
AI402	Curve Point 35 Y-Value					AO318					
AI403	Curve Point 36 X-Value					AO319					
AI404	Curve Point 36 Y-Value					AO320					
AI405	Curve Point 37 X-Value					AO321					
AI406	Curve Point 37 Y-Value					AO322					
AI407	Curve Point 38 X-Value					AO323					
AI408	Curve Point 38 Y-Value					AO324					
AI409	Curve Point 39 X-Value					AO325					
AI410	Curve Point 39 Y-Value					AO326					
AI411	Curve Point 40 X-Value					AO327					
AI412	Curve Point 40 Y-Value					AO328					
AI413	Curve Point 41 X-Value					AO329					
AI414	Curve Point 41 Y-Value					AO330					
AI415	Curve Point 42 X-Value					AO331					
AI416	Curve Point 42 Y-Value					AO332					
AI417	Curve Point 43 X-Value					AO333					
AI418	Curve Point 43 Y-Value					AO334					
AI419	Curve Point 44 X-Value					AO335					
AI420	Curve Point 44 Y-Value					AO336					
AI421	Curve Point 45 X-Value					AO337					
AI422	Curve Point 45 Y-Value					AO338					
AI423	Curve Point 46 X-Value					AO339					
AI424	Curve Point 46 Y-Value					AO340					
AI425	Curve Point 47 X-Value					AO341					
AI426	Curve Point 47 Y-Value					AO342					
AI427	Curve Point 48 X-Value					AO343					
AI428	Curve Point 48 Y-Value					AO344					
AI429	Curve Point 49 X-Value					AO345					
AI430	Curve Point 49 Y-Value					AO346					
AI431	Curve Point 50 X-Value					AO347					
AI432	Curve Point 50 Y-Value					AO348					
AI433	Curve Point 51 X-Value					AO349					
AI434	Curve Point 51 Y-Value					AO350					
AI435	Curve Point 52 X-Value					AO351					
AI436	Curve Point 52 Y-Value					AO352					
AI437	Curve Point 53 X-Value					AO353					
AI438	Curve Point 53 Y-Value					AO354					
AI439	Curve Point 54 X-Value					AO355					
AI440	Curve Point 54 Y-Value					AO356					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI441	Curve Point 55 X-Value					AO357					
AI442	Curve Point 55 Y-Value					AO358					
AI443	Curve Point 56 X-Value					AO359					
AI444	Curve Point 56 Y-Value					AO360					
AI445	Curve Point 57 X-Value					AO361					
AI446	Curve Point 57 Y-Value					AO362					
AI447	Curve Point 58 X-Value					AO363					
AI448	Curve Point 58 Y-Value					AO364					
AI449	Curve Point 59 X-Value					AO365					
AI450	Curve Point 59 Y-Value					AO366					
AI451	Curve Point 60 X-Value					AO367					
AI452	Curve Point 60 Y-Value					AO368					
AI453	Curve Point 61 X-Value					AO369					
AI454	Curve Point 61 Y-Value					AO370					
AI455	Curve Point 62 X-Value					AO371					
AI456	Curve Point 62 Y-Value					AO372					
AI457	Curve Point 63 X-Value					AO373					
AI458	Curve Point 63 Y-Value					AO374					
AI459	Curve Point 64 X-Value					AO375					
AI460	Curve Point 64 Y-Value					AO376					
AI461	Curve Point 65 X-Value					AO377					
AI462	Curve Point 65 Y-Value					AO378					
AI463	Curve Point 66 X-Value					AO379					
AI464	Curve Point 66 Y-Value					AO380					
AI465	Curve Point 67 X-Value					AO381					
AI466	Curve Point 67 Y-Value					AO382					
AI467	Curve Point 68 X-Value					AO383					
AI468	Curve Point 68 Y-Value					AO384					
AI469	Curve Point 69 X-Value					AO385					
AI470	Curve Point 69 Y-Value					AO386					
AI471	Curve Point 70 X-Value					AO387					
AI472	Curve Point 70 Y-Value					AO388					
AI473	Curve Point 71 X-Value					AO389					
AI474	Curve Point 71 Y-Value					AO390					
AI475	Curve Point 72 X-Value					AO391					
AI476	Curve Point 72 Y-Value					AO392					
AI477	Curve Point 73 X-Value					AO393					
AI478	Curve Point 73 Y-Value					AO394					
AI479	Curve Point 74 X-Value					AO395					
AI480	Curve Point 74 Y-Value					AO396					
AI481	Curve Point 75 X-Value					AO397					
AI482	Curve Point 75 Y-Value					AO398					
AI483	Curve Point 76 X-Value					AO399					
AI484	Curve Point 76 Y-Value					AO400					
AI485	Curve Point 77 X-Value					AO401					
AI486	Curve Point 77 Y-Value					AO402					
AI487	Curve Point 78 X-Value					AO403					
AI488	Curve Point 78 Y-Value					AO404					
AI489	Curve Point 79 X-Value					AO405					
AI490	Curve Point 79 Y-Value					AO406					
AI491	Curve Point 80 X-Value					AO407					
AI492	Curve Point 80 Y-Value					AO408					
AI493	Curve Point 81 X-Value					AO409					
AI494	Curve Point 81 Y-Value					AO410					
AI495	Curve Point 82 X-Value					AO411					
AI496	Curve Point 82 Y-Value					AO412					
AI497	Curve Point 83 X-Value					AO413					
AI498	Curve Point 83 Y-Value					AO414					
AI499	Curve Point 84 X-Value					AO415					
AI500	Curve Point 84 Y-Value					AO416					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI501	Curve Point 85 X-Value					AO417					
AI502	Curve Point 85 Y-Value					AO418					
AI503	Curve Point 86 X-Value					AO419					
AI504	Curve Point 86 Y-Value					AO420					
AI505	Curve Point 87 X-Value					AO421					
AI506	Curve Point 87 Y-Value					AO422					
AI507	Curve Point 88 X-Value					AO423					
AI508	Curve Point 88 Y-Value					AO424					
AI509	Curve Point 89 X-Value					AO425					
AI510	Curve Point 89 Y-Value					AO426					
AI511	Curve Point 90 X-Value					AO427					
AI512	Curve Point 90 Y-Value					AO428					
AI513	Curve Point 91 X-Value					AO429					
AI514	Curve Point 91 Y-Value					AO430					
AI515	Curve Point 92 X-Value					AO431					
AI516	Curve Point 92 Y-Value					AO432					
AI517	Curve Point 93 X-Value					AO433					
AI518	Curve Point 93 Y-Value					AO434					
AI519	Curve Point 94 X-Value					AO435					
AI520	Curve Point 94 Y-Value					AO436					
AI521	Curve Point 95 X-Value					AO437					
AI522	Curve Point 95 Y-Value					AO438					
AI523	Curve Point 96 X-Value					AO439					
AI524	Curve Point 96 Y-Value					AO440					
AI525	Curve Point 97 X-Value					AO441					
AI526	Curve Point 97 Y-Value					AO442					
AI527	Curve Point 98 X-Value					AO443					
AI528	Curve Point 98 Y-Value					AO444					
AI529	Curve Point 99 X-Value					AO445					
AI530	Curve Point 99 Y-Value					AO446					
AI531	Curve Point 100 X-Value					AO447					
AI532	Curve Point 100 Y-Value					AO448					
AI533	System Meter Type of Connection Point								1		
AI534	System Meter Type of Circuit Phases								1		
AI535	System Meter Apparent Power Calculation Method								1		
AI536	System Meter Frequency								0.001		
AI537	System Meter Active Power								1		
AI538	System Meter Active Power A								1		
AI539	System Meter Active Power B								1		
AI540	System Meter Active Power C								1		
AI541	System Meter Reactive Power								1		
AI542	System Meter Reactive Power A								1		
AI543	System Meter Reactive Power B								1		
AI544	System Meter Reactive Power C								1		
AI545	System Meter Power Factor								0.01		
AI546	System Meter Apparent Power								1		
AI547	System Meter Phase A Volts								0.1		
AI548	System Meter Phase A Angle								0.1		
AI549	System Meter Phase B Volts								0.1		
AI550	System Meter Phase B Angle								0.1		
AI551	System Meter Phase C Volts								0.1		
AI552	System Meter Phase C Angle								0.1		
AI553	System Meter Average Line to Line Voltage								0.1		
AI554	System Meter Current A								0.1		
AI555	System Meter Current B								0.1		
AI556	System Meter Current C								0.1		
AI557	System Meter Active Power High Threshold					AO449			1		
AI558	System Meter Active Power Low Threshold					AO450			1		
AI559	System Meter Reactive Power High Threshold					AO451			1		
AI560	System Meter Reactive Power Low Threshold					AO452			1		

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI561	System Meter Power Factor High Threshold					AO453			0.01		
AI562	System Meter Power Factor Low Threshold					AO454			0.01		
AI563	System Meter Phase A Volts High Threshold					AO455			0.1		
AI564	System Meter Phase A Volts Low Threshold					AO456			0.1		
AI565	System Meter Phase B Volts High Threshold					AO457			0.1		
AI566	System Meter Phase B Volts Low Threshold					AO458			0.1		
AI567	System Meter Phase C Volts High Threshold					AO459			0.1		
AI568	System Meter Phase C Volts Low Threshold					AO460			0.1		
AI569	Running Schedule Index										
AI570	Schedule to Edit Selector					AO461					
AI571	Selected Schedule Idenity					AO462					
AI572	Selected Schedule Priority					AO463					
AI573	Selected Schedule Type					AO464					
AI574	Selected Schedule Start Date					AO465					
AI575	Selected Schedule Start Time					AO466					
AI576	Selected Schedule Repeat Interval					AO467					
AI577	Selected Schedule Repeat Interval Units					AO468					
AI578	Selected Schedule Validation Status										
AI579	Selected Schedule Status										
AI580	Selected Schedule Number of Points										
AI581	Schedule Point 1 Time Offset					AO470					
AI582	Schedule Point 1 Value					AO471					
AI583	Schedule Point 2 Time Offset					AO472					
AI584	Schedule Point 2 Value					AO473					
AI585	Schedule Point 3 Time Offset					AO474					
AI586	Schedule Point 3 Value					AO475					
AI587	Schedule Point 4 Time Offset					AO476					
AI588	Schedule Point 4 Value					AO477					
AI589	Schedule Point 5 Time Offset					AO478					
AI590	Schedule Point 5 Value					AO479					
AI591	Schedule Point 6 Time Offset					AO480					
AI592	Schedule Point 6 Value					AO481					
AI593	Schedule Point 7 Time Offset					AO482					
AI594	Schedule Point 7 Value					AO483					
AI595	Schedule Point 8 Time Offset					AO484					
AI596	Schedule Point 8 Value					AO485					
AI597	Schedule Point 9 Time Offset					AO486					
AI598	Schedule Point 9 Value					AO487					
AI599	Schedule Point 10 Time Offset					AO488					
AI600	Schedule Point 10 Value					AO489					
AI601	Schedule Point 11 Time Offset					AO490					
AI602	Schedule Point 11 Value					AO491					
AI603	Schedule Point 12 Time Offset					AO492					
AI604	Schedule Point 12 Value					AO493					
AI605	Schedule Point 13 Time Offset					AO494					
AI606	Schedule Point 13 Value					AO495					
AI607	Schedule Point 14 Time Offset					AO496					
AI608	Schedule Point 14 Value					AO497					
AI609	Schedule Point 15 Time Offset					AO498					
AI610	Schedule Point 15 Value					AO499					
AI611	Schedule Point 16 Time Offset					AO500					
AI612	Schedule Point 16 Value					AO501					
AI613	Schedule Point 17 Time Offset					AO502					
AI614	Schedule Point 17 Value					AO503					
AI615	Schedule Point 18 Time Offset					AO504					
AI616	Schedule Point 18 Value					AO505					
AI617	Schedule Point 19 Time Offset					AO506					
AI618	Schedule Point 19 Value					AO507					
AI619	Schedule Point 20 Time Offset					AO508					
AI620	Schedule Point 20 Value					AO509					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI621	Schedule Point 21 Time Offset					AO510					
AI622	Schedule Point 21 Value					AO511					
AI623	Schedule Point 22 Time Offset					AO512					
AI624	Schedule Point 22 Value					AO513					
AI625	Schedule Point 23 Time Offset					AO514					
AI626	Schedule Point 23 Value					AO515					
AI627	Schedule Point 24 Time Offset					AO516					
AI628	Schedule Point 24 Value					AO517					
AI629	Schedule Point 25 Time Offset					AO518					
AI630	Schedule Point 25 Value					AO519					
AI631	Schedule Point 26 Time Offset					AO520					
AI632	Schedule Point 26 Value					AO521					
AI633	Schedule Point 27 Time Offset					AO522					
AI634	Schedule Point 27 Value					AO523					
AI635	Schedule Point 28 Time Offset					AO524					
AI636	Schedule Point 28 Value					AO525					
AI637	Schedule Point 29 Time Offset					AO526					
AI638	Schedule Point 29 Value					AO527					
AI639	Schedule Point 30 Time Offset					AO528					
AI640	Schedule Point 30 Value					AO529					
AI641	Schedule Point 31 Time Offset					AO530					
AI642	Schedule Point 31 Value					AO531					
AI643	Schedule Point 32 Time Offset					AO532					
AI644	Schedule Point 32 Value					AO533					
AI645	Schedule Point 33 Time Offset					AO534					
AI646	Schedule Point 33 Value					AO535					
AI647	Schedule Point 34 Time Offset					AO536					
AI648	Schedule Point 34 Value					AO537					
AI649	Schedule Point 35 Time Offset					AO538					
AI650	Schedule Point 35 Value					AO539					
AI651	Schedule Point 36 Time Offset					AO540					
AI652	Schedule Point 36 Value					AO541					
AI653	Schedule Point 37 Time Offset					AO542					
AI654	Schedule Point 37 Value					AO543					
AI655	Schedule Point 38 Time Offset					AO544					
AI656	Schedule Point 38 Value					AO545					
AI657	Schedule Point 39 Time Offset					AO546					
AI658	Schedule Point 39 Value					AO547					
AI659	Schedule Point 40 Time Offset					AO548					
AI660	Schedule Point 40 Value					AO549					
AI661	Schedule Point 41 Time Offset					AO550					
AI662	Schedule Point 41 Value					AO551					
AI663	Schedule Point 42 Time Offset					AO552					
AI664	Schedule Point 42 Value					AO553					
AI665	Schedule Point 43 Time Offset					AO554					
AI666	Schedule Point 43 Value					AO555					
AI667	Schedule Point 44 Time Offset					AO556					
AI668	Schedule Point 44 Value					AO557					
AI669	Schedule Point 45 Time Offset					AO558					
AI670	Schedule Point 45 Value					AO559					
AI671	Schedule Point 46 Time Offset					AO560					
AI672	Schedule Point 46 Value					AO561					
AI673	Schedule Point 47 Time Offset					AO562					
AI674	Schedule Point 47 Value					AO563					
AI675	Schedule Point 48 Time Offset					AO564					
AI676	Schedule Point 48 Value					AO565					
AI677	Schedule Point 49 Time Offset					AO566					
AI678	Schedule Point 49 Value					AO567					
AI679	Schedule Point 50 Time Offset					AO568					
AI680	Schedule Point 50 Value					AO569					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI681	Schedule Point 51 Time Offset					AO570					
AI682	Schedule Point 51 Value					AO571					
AI683	Schedule Point 52 Time Offset					AO572					
AI684	Schedule Point 52 Value					AO573					
AI685	Schedule Point 53 Time Offset					AO574					
AI686	Schedule Point 53 Value					AO575					
AI687	Schedule Point 54 Time Offset					AO576					
AI688	Schedule Point 54 Value					AO577					
AI689	Schedule Point 55 Time Offset					AO578					
AI690	Schedule Point 55 Value					AO579					
AI691	Schedule Point 56 Time Offset					AO580					
AI692	Schedule Point 56 Value					AO581					
AI693	Schedule Point 57 Time Offset					AO582					
AI694	Schedule Point 57 Value					AO583					
AI695	Schedule Point 58 Time Offset					AO584					
AI696	Schedule Point 58 Value					AO585					
AI697	Schedule Point 59 Time Offset					AO586					
AI698	Schedule Point 59 Value					AO587					
AI699	Schedule Point 60 Time Offset					AO588					
AI700	Schedule Point 60 Value					AO589					
AI701	Schedule Point 61 Time Offset					AO590					
AI702	Schedule Point 61 Value					AO591					
AI703	Schedule Point 62 Time Offset					AO592					
AI704	Schedule Point 62 Value					AO593					
AI705	Schedule Point 63 Time Offset					AO594					
AI706	Schedule Point 63 Value					AO595					
AI707	Schedule Point 64 Time Offset					AO596					
AI708	Schedule Point 64 Value					AO597					
AI709	Schedule Point 65 Time Offset					AO598					
AI710	Schedule Point 65 Value					AO599					
AI711	Schedule Point 66 Time Offset					AO600					
AI712	Schedule Point 66 Value					AO601					
AI713	Schedule Point 67 Time Offset					AO602					
AI714	Schedule Point 67 Value					AO603					
AI715	Schedule Point 68 Time Offset					AO604					
AI716	Schedule Point 68 Value					AO605					
AI717	Schedule Point 69 Time Offset					AO606					
AI718	Schedule Point 69 Value					AO607					
AI719	Schedule Point 70 Time Offset					AO608					
AI720	Schedule Point 70 Value					AO609					
AI721	Schedule Point 71 Time Offset					AO610					
AI722	Schedule Point 71 Value					AO611					
AI723	Schedule Point 72 Time Offset					AO612					
AI724	Schedule Point 72 Value					AO613					
AI725	Schedule Point 73 Time Offset					AO614					
AI726	Schedule Point 73 Value					AO615					
AI727	Schedule Point 74 Time Offset					AO616					
AI728	Schedule Point 74 Value					AO617					
AI729	Schedule Point 75 Time Offset					AO618					
AI730	Schedule Point 75 Value					AO619					
AI731	Schedule Point 76 Time Offset					AO620					
AI732	Schedule Point 76 Value					AO621					
AI733	Schedule Point 77 Time Offset					AO622					
AI734	Schedule Point 77 Value					AO623					
AI735	Schedule Point 78 Time Offset					AO624					
AI736	Schedule Point 78 Value					AO625					
AI737	Schedule Point 79 Time Offset					AO626					
AI738	Schedule Point 79 Value					AO627					
AI739	Schedule Point 80 Time Offset					AO628					
AI740	Schedule Point 80 Value					AO629					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AI741	Schedule Point 81 Time Offset					AO630					
AI742	Schedule Point 81 Value					AO631					
AI743	Schedule Point 82 Time Offset					AO632					
AI744	Schedule Point 82 Value					AO633					
AI745	Schedule Point 83 Time Offset					AO634					
AI746	Schedule Point 83 Value					AO635					
AI747	Schedule Point 84 Time Offset					AO636					
AI748	Schedule Point 84 Value					AO637					
AI749	Schedule Point 85 Time Offset					AO638					
AI750	Schedule Point 85 Value					AO639					
AI751	Schedule Point 86 Time Offset					AO640					
AI752	Schedule Point 86 Value					AO641					
AI753	Schedule Point 87 Time Offset					AO642					
AI754	Schedule Point 87 Value					AO643					
AI755	Schedule Point 88 Time Offset					AO644					
AI756	Schedule Point 88 Value					AO645					
AI757	Schedule Point 89 Time Offset					AO646					
AI758	Schedule Point 89 Value					AO647					
AI759	Schedule Point 90 Time Offset					AO648					
AI760	Schedule Point 90 Value					AO649					
AI761	Schedule Point 91 Time Offset					AO650					
AI762	Schedule Point 91 Value					AO651					
AI763	Schedule Point 92 Time Offset					AO652					
AI764	Schedule Point 92 Value					AO653					
AI765	Schedule Point 93 Time Offset					AO654					
AI766	Schedule Point 93 Value					AO655					
AI767	Schedule Point 94 Time Offset					AO656					
AI768	Schedule Point 94 Value					AO657					
AI769	Schedule Point 95 Time Offset					AO658					
AI770	Schedule Point 95 Value					AO659					
AI771	Schedule Point 96 Time Offset					AO660					
AI772	Schedule Point 96 Value					AO661					
AI773	Schedule Point 97 Time Offset					AO662					
AI774	Schedule Point 97 Value					AO663					
AI775	Schedule Point 98 Time Offset					AO664					
AI776	Schedule Point 98 Value					AO665					
AI777	Schedule Point 99 Time Offset					AO666					
AI778	Schedule Point 99 Value					AO667					
AI779	Schedule Point 100 Time Offset					AO668					
AI780	Schedule Point 100 Value					AO669					
AI781	Schedule 1 Status										
AI782	Schedule 1 Priority										
AI783	Schedule 1 Active Time Value										

Spreadsheet Tab Name: *AO*

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO0	Reference Voltage					AI29			0.1		
AO1	Reference Voltage Offset					AI30			0.1		
AO2	Nominal Grid Frequency					AI31			0.001		
AO3	Open Loop Response Time Percentage								0.1		
AO4	Power Factor Sign convention:					AI41			1		
AO5	Reference for Reactive Power Setpoints								1		
AO6	DER Start (Return to Service) Voltage High Limit					AI50			0.01		
AO7	DER Start (Return to Service) Voltage Low Limit					AI51			0.01		
AO8	DER Start (Return to Service) Frequency High Limit					AI52			0.001		
AO9	DER Start (Return to Service) Frequency Low Limit					AI53			0.001		
AO10	DER Start (Return to Service) Delay								1		
AO11	DER Start (Return to Service) Time Window								1		
AO12	DER Start (Return to Service) Ramp Up Time					AI56			1		
AO13	DER Stop (Cease to Energize)Time Window								1		
AO14	DER Stop (Cease to Energize) Ramp Down Time					AI58			1		
AO15	DER Stop (Cease to Energize) Reversion Timeout Period								1		
AO16	Connect/Disconnect Time Window					AI60			1		
AO17	Connect/Disconnect Reversion Timeout Period					AI61			1		
AO18	Requested Settings Group								1		
AO19	Settings Group Being Edited								1		
AO20	Freeze Counter Interval								1		
AO21	Freeze Counter Interval Units					AI70			1		
AO22	Low/High Voltage Ride-Through Signal Meter ID								1		
AO23	Low/High Voltage Ride-Through High Must Trip Curve Index					AI73			1		
AO24	Low/High Voltage Ride-Through Low Must Trip Curve Index					AI74			1		
AO25	Low/High Voltage Ride-Through High Momentary Cessation Curve Index					AI75			1		
AO26	Low/High Voltage Ride-Through Low Momentary Cessation Curve Index					AI76			1		
AO27	Low/High Frequency Ride-Through Signal Meter ID								1		
AO28	Low/High Frequency Ride-Through High Must Trip Curve Index					AI79			1		
AO29	Low/High Frequency Ride-Through Low Must Trip Curve Index					AI80			1		
AO30	Low/High Frequency Ride-Through High Momentary Cessation Curve Index					AI81			1		
AO31	Low/High Frequency Ride-Through Low Momentary Cessation Curve Index					AI82			1		
AO32	Dynamic Reactive Current Support Mode Priority					AI83			1		
AO33	Dynamic Reactive Current Support Enabling Time Window					AI84			1		
AO34	Dynamic Reactive Current Support Enabling Ramp Time					AI85			1		
AO35	Dynamic Reactive Current Support Reversion Timeout Period					AI86			1		
AO36	Dynamic Reactive Current Support Signal Meter ID								1		
AO37	Dynamic Reactive Current Support - Gradient Mode					AI91			1		
AO38	Dynamic Reactive Current Support Deadband Minimum Voltage					AI92			0.1		
AO39	Dynamic Reactive Current Support Deadband Maximum Voltage					AI93			0.1		
AO40	Dynamic Reactive Current Support Gradient for Sags					AI94			0.001		
AO41	Dynamic Reactive Current Support Gradient for Swells					AI95			0.001		
AO42	Dynamic Reactive Current Support Filter Time for Moving Average Voltage (RDGS					AI96			1		
AO43	Dynamic Reactive Current Support Block Zone Voltage					AI97			0.1		
AO44	Dynamic Reactive Current Support Hysteresis Block Zone Voltage					AI98			0.1		
AO45	Dynamic Reactive Current Support Block Zone Time					AI99			1		

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO46	Dynamic Reactive Current Support Start Hold Time								1		
AO47	Dynamic Reactive Current Support End Hold Time					AI100			1		
AO48	Dynamic Volt-Watt Mode Priority					AI102			1		
AO49	Dynamic Volt-Watt Enabling Time Window					AI103			1		
AO50	Dynamic Volt-Watt Enabling Ramp Time					AI104			1		
AO51	Dynamic Volt-Watt Reversion Timeout period					AI105			1		
AO52	Dynamic Volt-Watt Signal Meter ID								1		
AO53	Dynamic Volt-Watt Gradient					AI110			0.001		
AO54	Dynamic Volt-Watt Filter Time					AI111			1		
AO55	Dynamic Volt-Watt Lower Deadband					AI112			0.1		
AO56	Dynamic Volt-Watt Upper Deadband					AI113			0.1		
AO57	Frequency-Watt Mode Priority					AI115			1		
AO58	Frequency-Watt Enabling Time Window								1		
AO59	Frequency-Watt Enabling Ramp Time								1		
AO60	Frequency-Watt Reversion Timeout Period								1		
AO61	Frequency-Watt Signal Meter ID								1		
AO62	Frequency-Watt High Starting Frequency								0.001		
AO63	Frequency-Watt High Stopping Frequency								0.001		
AO64	Frequency-Watt High Discharging / Generating Gradient					AI123			0.001		
AO65	Frequency-Watt High Charging Gradient					AI124			0.001		
AO66	Frequency-Watt Low Starting Frequency								0.001		
AO67	Frequency-Watt Low Stopping Frequency								0.001		
AO68	Frequency-Watt Low Discharging / Generating Gradient					AI127			0.001		
AO69	Frequency-Watt Low Charging Gradient					AI128			0.001		
AO70	Frequency-Watt Start Delay					AI129			1		
AO71	Frequency-Watt Stop Delay					AI130			1		
AO72	Frequency-Watt Ramp Up Time Constant								1		
AO73	Frequency-Watt Ramp Down Time Constant								1		
AO74	Frequency-Watt Discharge Ramp Up Rate								0.1		
AO75	Frequency-Watt Discharge Ramp Down Rate								0.1		
AO76	Frequency-Watt Charge Ramp Up Rate								0.1		
AO77	Frequency-Watt Charge Ramp Down Rate								0.1		
AO78	Frequency-Watt Hi Return Gradient								0.001		
AO79	Frequency-Watt Low Return Gradient								0.001		
AO80	Frequency-Watt Minimum Usable SOC								0.1		
AO81	Frequency-Watt Maximum Usable SOC								0.1		
AO82	Active Power Limit Mode Priority					AI142			1		
AO83	Active Power Limit Enabling Time Window					AI143			1		
AO84	Active Power Limit Enabling Ramp Time					AI144			1		
AO85	Active Power Limit Reversion Timeout Period					AI145			1		
AO86	Active Power Limit Signal Meter ID								1		
AO87	Active Power Limit Charge Setpoint					AI148			0.1		
AO88	Active Power Limit Discharge Setpoint					AI149			0.1		
AO89	Charge/Discharge Mode Priority					AI150			1		
AO90	Charge/Discharge Enabling Time Window					AI151			1		
AO91	Charge/Discharge Enabling Ramp Time					AI152			1		
AO92	Charge/Discharge Reversion Timeout Period					AI153			1		
AO93	Charge/Discharge Active Power Target					AI154			0.1		
AO94	Charge/Discharge Ramp Up Time Constant								1		
AO95	Charge/Discharge Ramp Down Time Constant								1		
AO96	Charge/Discharge Discharge Ramp Up Rate								0.1		
AO97	Charge/Discharge Discharge Ramp Down Rate								0.1		
AO98	Charge/Discharge Charge Ramp Up Rate								0.1		
AO99	Charge/Discharge Charge Ramp Down Rate								0.1		
AO100	Charge/Discharge Minimum Reserve for Storage					AI161			0.1		

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO101	Charge/Discharge Maximum Reserve for Storage					AI162			0.1		
AO102	Coordinated Charge/Discharge Mode Priority					AI163			1		
AO103	Coordinated Charge/Discharge Enabling Time Window					AI164			1		
AO104	Coordinated Charge/Discharge Enabling Ramp Time					AI165			1		
AO105	Coordinated Charge/Discharge Reversion Timeout Period					AI166			1		
AO106	Coordinated Charge/Discharge Target State of Charge					AI167			0.1		
AO107	Coordinated Charge/Discharge Target Date								1		
AO108	Coordinated Charge/Discharge Target Time					AI169			1		
AO109	Coordinated Charge/Discharge Energy Request					AI170			1		
AO110	Coordinated Charge/Discharge Minimum Charging Duration					AI171			1		
AO111	Coordinated Charge/Discharge Date of Reference					AI172			1		
AO112	Coordinated Charge/Discharge Time of Reference					AI173			1		
AO113	Coordinated Charge/Discharge Duration at Maximum Charge Rate					AI174			1		
AO114	Coordinated Charge/Discharge Duration at Maximum Discharge Rate					AI175			1		
AO115	Active Power Response Mode #1 Priority					AI176			1		
AO116	Active Power Response Mode #1 Enabling Time Window					AI177			1		
AO117	Active Power Response Mode #1 Enabling Ramp Time					AI178			1		
AO118	Active Power Response Mode #1 Reversion Timeout Period					AI179			1		
AO119	Active Power Response Mode #1 Signal Meter ID								1		
AO120	Active Power Response Mode #1 Power Threshold					AI182			1		
AO121	Active Power Response Mode #1 Ratio					AI183			0.1		
AO122	Active Power Response Mode #1 Ramp Up Rate					AI184			0.1		
AO123	Active Power Response Mode #1 Ramp Down Rate					AI185			0.1		
AO124	Active Power Response Mode #2 Priority					AI187			1		
AO125	Active Power Response Mode #2 Enabling Time Window					AI188			1		
AO126	Active Power Response Mode #2 Enabling Ramp Time					AI189			1		
AO127	Active Power Response Mode #2 Reversion Timeout Period					AI190			1		
AO128	Active Power Response Mode #2 Signal Meter ID								1		
AO129	Active Power Response Mode #2 Power Threshold					AI193			1		
AO130	Active Power Response Mode #2 Ratio					AI194			0.1		
AO131	Active Power Response Mode #2 Ramp Up Rate					AI195			0.1		
AO132	Active Power Response Mode #2 Ramp Down Rate					AI196			0.1		
AO133	Active Power Response Mode #3 Priority					AI198			1		
AO134	Active Power Response Mode #3 Enabling Time Window					AI199			1		
AO135	Active Power Response Mode #3 Enabling Ramp Time					AI200			1		
AO136	Active Power Response Mode #3 Reversion Timeout Period					AI201			1		
AO137	Active Power Response Mode #3 Signal Meter ID								1		
AO138	Active Power Response Mode #3 Power Threshold					AI204			1		
AO139	Active Power Response Mode #3 Ratio					AI205			0.1		
AO140	Active Power Response Mode #3 Ramp Up Rate					AI206			0.1		
AO141	Active Power Response Mode #3 Ramp Down Rate					AI207			0.1		
AO142	AGC Mode Priority					AI209			1		
AO143	AGC Enabling Time Window					AI210			1		
AO144	AGC Enabling Ramp Time					AI211			1		
AO145	AGC Reversion Timeout Period					AI212			1		
AO146	AGC Active Power Target					AI213			1		
AO147	AGC Ramp Time Constant Up Time								1		
AO148	AGC Ramp Time Constant Down Time								1		
AO149	AGC Discharge Ramp Up Rate								0.1		
AO150	AGC Discharge Ramp Down Rate								0.1		
AO151	AGC Charge Ramp Up Rate								0.1		
AO152	AGC Charge Ramp Down Rate								0.1		
AO153	AGC Minimum Usable SOC					AI220			0.1		
AO154	AGC Maximum Usable SOC					AI221			0.1		
AO155	Active Power Smoothing Mode Priority					AI227			1		

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO156	Active Power Smoothing Enabling Time Window					AI228			1		
AO157	Active Power Smoothing Enabling Ramp Time					AI229			1		
AO158	Active Power Smoothing Reversion Timeout Period					AI230			1		
AO159	Active Power Smoothing Signal Meter ID								1		
AO160	Active Power Smoothing Gradient					AI233			0.001		
AO161	Active Power Smoothing Lower Limit					AI234			1		
AO162	Active Power Smoothing Upper Limit					AI235			1		
AO163	Active Power Smoothing Filter Time (Seconds)					AI236			1		
AO164	Active Power Smoothing Discharge Ramp Up Rate								0.1		
AO165	Active Power Smoothing Discharge Ramp Down Rate								0.1		
AO166	Active Power Smoothing Charge Ramp Up Rate								0.1		
AO167	Active Power Smoothing Charge Ramp Down Rate								0.1		
AO168	Volt-Watt Mode Priority					AI242			1		
AO169	Volt-Watt Enabling Time Window					AI243			1		
AO170	Volt-Watt Enabling Ramp Time					AI244			1		
AO171	Volt-Watt Reversion Timeout Period					AI245			1		
AO172	Volt-Watt Signal Meter ID								1		
AO173	Volt-Watt Curve Index					AI248			1		
AO174	Volt-Watt Filter Time (Seconds)					AI250			1		
AO175	Volt-Watt Ramp Up Time Constant								1		
AO176	Volt-Watt Ramp Down Time Constant								1		
AO177	Volt-Watt Discharging Ramp Up Rate								0.1		
AO178	Volt-Watt Discharging Ramp Down Rate								0.1		
AO179	Volt-Watt Charging Ramp Up Rate								0.1		
AO180	Volt-Watt Charging Ramp Down Rate								0.1		
AO181	Frequency-Watt Curve Mode Priority					AI257			1		
AO182	Frequency-Watt Curve Enabling Time Window					AI258			1		
AO183	Frequency-Watt Curve Enabling Ramp Time					AI259			1		
AO184	Frequency-Watt Curve Reversion Timeout Period					AI260			1		
AO185	Frequency-Watt Curve Signal Meter ID								1		
AO186	Frequency-Watt Curve - Curve Index					AI263			1		
AO187	Frequency-Watt Curve - High Frequency Hysteresis Curve Index					AI264			1		
AO188	Frequency-Watt Curve - Low Frequency Hysteresis Curve Index					AI265			1		
AO189	Frequency-Watt Curve Start Delay					AI266			1		
AO190	Frequency-Watt Curve Stop Delay					AI267			1		
AO191	Frequency-Watt Curve Ramp Up Time Constant								1		
AO192	Frequency-Watt Curve Ramp Down Time Constant					AI269			1		
AO193	Frequency-Watt Curve Discharge Ramp Up Rate					AI270			0.1		
AO194	Frequency-Watt Curve Discharge Ramp Down Rate					AI271			0.1		
AO195	Frequency-Watt Curve Charge Ramp Up Rate					AI272			0.1		
AO196	Frequency-Watt Curve Charge Ramp Down Rate					AI273			0.1		
AO197	Frequency-Watt Curve Minimum Usable SOC					AI275			0.1		
AO198	Frequency-Watt Curve Maximum Usable SOC					AI276			0.1		
AO199	Constant VArs Mode Priority					AI277			1		
AO200	Constant VArs Enabling Time Window					AI278			1		
AO201	Constant VArs Enabling Ramp Time					AI279			1		
AO202	Constant VArs Reversion Timeout Period					AI280			1		
AO203	Constant VArs Reactive Power Target					AI281			0.1		
AO204	Constant VArs Ramp Up Time Constant								1		
AO205	Constant VArs Ramp Down Time Constant					AI283			1		
AO206	Fixed Power Factor Mode Priority					AI284			1		
AO207	Fixed Power Factor Enabling Time Window					AI285			1		
AO208	Fixed Power Factor Enabling Ramp Time					AI286			1		
AO209	Fixed Power Factor Reversion Timeout Period					AI287			1		
AO210	Fixed Power Factor Setpoint - Generation/Discharging					AI288			0.01		

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO211	Fixed Power Factor Setpoint - Charging					AI289			0.01		
AO212	Volt-VAr Control Mode Priority					AI290			1		
AO213	Volt-VAr Control Enabling Time Window					AI291			1		
AO214	Volt-VAr Control Enabling Ramp Time					AI292			1		
AO215	Volt-VAr Control Reversion Timeout Period					AI293			1		
AO216	Volt-VAr Control Signal Meter ID								1		
AO217	Volt-VAr Curve Index					AI297			1		
AO218	Volt-VAr Ramp Up Time Constant								1		
AO219	Volt-VAr Ramp Down Time Constant					AI299			1		
AO220	Volt-VAr Autonomous Voltage Reference Adjustment Time Constant					AI300			1		
AO221	Watt-VAr Mode Priority					AI302			1		
AO222	Watt-VAr Enabling Time Window					AI303			1		
AO223	Watt-VAr Enabling Ramp Time					AI304			1		
AO224	Watt-VAr Reversion Timeout Period					AI305			1		
AO225	Watt-VAr Signal Meter ID								1		
AO226	Watt-VAr Curve Index					AI308			1		
AO227	Watt-VAr Ramp Up Time Constant								1		
AO228	Watt-VAr Ramp Down Time Constant					AI310			1		
AO229	Power Factor Correction Mode Priority					AI312			1		
AO230	Power Factor Correction Enabling Time Window					AI313			1		
AO231	Power Factor Correction Enabling Ramp Time								1		
AO232	Power Factor Correction Reversion Timeout Period					AI315			1		
AO233	Power Factor Correction Signal Meter ID								1		
AO234	Power Factor Correction Average PF Target					AI318			0.01		
AO235	Power Factor Correction Lower PF Limit								0.01		
AO236	Power Factor Correction Upper PF Limit					AI320			0.01		
AO237	Pricing Mode Priority					AI321			1		
AO238	Pricing Mode Enabling Time Window					AI322			1		
AO239	Pricing Mode Enabling Ramp Time					AI323			1		
AO240	Pricing Mode Reversion Timeout period					AI324			1		
AO241	Pricing Mode Setpoint					AI325			0.01		
AO242	Pricing Mode Ramp Up Time Constant					AI326			1		
AO243	Pricing Mode Ramp Down Time Constant					AI327			1		
AO244	Curve Edit Selector					AI328			1		
AO245	Curve Mode Type					AI329			1		
AO246	Curve Number of Points					AI330			1		
AO247	Independent (X-Value) Units for Curve					AI331			1		
AO248	Dependent (Y-Value) Units for Curve					AI332			1		
AO249	Curve Point 1 X-Value					AI333					
AO250	Curve Point 1 Y-Value					AI334					
AO251	Curve Point 2 X-Value					AI335					
AO252	Curve Point 2 Y-Value					AI336					
AO253	Curve Point 3 X-Value					AI337					
AO254	Curve Point 3 Y-Value					AI338					
AO255	Curve Point 4 X-Value					AI339					
AO256	Curve Point 4 Y-Value					AI340					
AO257	Curve Point 5 X-Value					AI341					
AO258	Curve Point 5 Y-Value					AI342					
AO259	Curve Point 6 X-Value					AI343					
AO260	Curve Point 6 Y-Value					AI344					
AO261	Curve Point 7 X-Value					AI345					
AO262	Curve Point 7 Y-Value					AI346					
AO263	Curve Point 8 X-Value					AI347					
AO264	Curve Point 8 Y-Value					AI348					
AO265	Curve Point 9 X-Value					AI349					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO266	Curve Point 9 Y-Value					AI350					
AO267	Curve Point 10 X-Value					AI351					
AO268	Curve Point 10 Y-Value					AI352					
AO269	Curve Point 11 X-Value					AI353					
AO270	Curve Point 11 Y-Value					AI354					
AO271	Curve Point 12 X-Value					AI355					
AO272	Curve Point 12 Y-Value					AI356					
AO273	Curve Point 13 X-Value					AI357					
AO274	Curve Point 13 Y-Value					AI358					
AO275	Curve Point 14 X-Value					AI359					
AO276	Curve Point 14 Y-Value					AI360					
AO277	Curve Point 15 X-Value					AI361					
AO278	Curve Point 15 Y-Value					AI362					
AO279	Curve Point 16 X-Value					AI363					
AO280	Curve Point 16 Y-Value					AI364					
AO281	Curve Point 17 X-Value					AI365					
AO282	Curve Point 17 Y-Value					AI366					
AO283	Curve Point 18 X-Value					AI367					
AO284	Curve Point 18 Y-Value					AI368					
AO285	Curve Point 19 X-Value					AI369					
AO286	Curve Point 19 Y-Value					AI370					
AO287	Curve Point 20 X-Value					AI371					
AO288	Curve Point 20 Y-Value					AI372					
AO289	Curve Point 21 X-Value					AI373					
AO290	Curve Point 21 Y-Value					AI374					
AO291	Curve Point 22 X-Value					AI375					
AO292	Curve Point 22 Y-Value					AI376					
AO293	Curve Point 23 X-Value					AI377					
AO294	Curve Point 23 Y-Value					AI378					
AO295	Curve Point 24 X-Value					AI379					
AO296	Curve Point 24 Y-Value					AI380					
AO297	Curve Point 25 X-Value					AI381					
AO298	Curve Point 25 Y-Value					AI382					
AO299	Curve Point 26 X-Value					AI383					
AO300	Curve Point 26 Y-Value					AI384					
AO301	Curve Point 27 X-Value					AI385					
AO302	Curve Point 27 Y-Value					AI386					
AO303	Curve Point 28 X-Value					AI387					
AO304	Curve Point 28 Y-Value					AI388					
AO305	Curve Point 29 X-Value					AI389					
AO306	Curve Point 29 Y-Value					AI390					
AO307	Curve Point 30 X-Value					AI391					
AO308	Curve Point 30 Y-Value					AI392					
AO309	Curve Point 31 X-Value					AI393					
AO310	Curve Point 31 Y-Value					AI394					
AO311	Curve Point 32 X-Value					AI395					
AO312	Curve Point 32 Y-Value					AI396					
AO313	Curve Point 33 X-Value					AI397					
AO314	Curve Point 33 Y-Value					AI398					
AO315	Curve Point 34 X-Value					AI399					
AO316	Curve Point 34 Y-Value					AI400					
AO317	Curve Point 35 X-Value					AI401					
AO318	Curve Point 35 Y-Value					AI402					
AO319	Curve Point 36 X-Value					AI403					
AO320	Curve Point 36 Y-Value					AI404					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO321	Curve Point 37 X-Value					AI405					
AO322	Curve Point 37 Y-Value					AI406					
AO323	Curve Point 38 X-Value					AI407					
AO324	Curve Point 38 Y-Value					AI408					
AO325	Curve Point 39 X-Value					AI409					
AO326	Curve Point 39 Y-Value					AI410					
AO327	Curve Point 40 X-Value					AI411					
AO328	Curve Point 40 Y-Value					AI412					
AO329	Curve Point 41 X-Value					AI413					
AO330	Curve Point 41 Y-Value					AI414					
AO331	Curve Point 42 X-Value					AI415					
AO332	Curve Point 42 Y-Value					AI416					
AO333	Curve Point 43 X-Value					AI417					
AO334	Curve Point 43 Y-Value					AI418					
AO335	Curve Point 44 X-Value					AI419					
AO336	Curve Point 44 Y-Value					AI420					
AO337	Curve Point 45 X-Value					AI421					
AO338	Curve Point 45 Y-Value					AI422					
AO339	Curve Point 46 X-Value					AI423					
AO340	Curve Point 46 Y-Value					AI424					
AO341	Curve Point 47 X-Value					AI425					
AO342	Curve Point 47 Y-Value					AI426					
AO343	Curve Point 48 X-Value					AI427					
AO344	Curve Point 48 Y-Value					AI428					
AO345	Curve Point 49 X-Value					AI429					
AO346	Curve Point 49 Y-Value					AI430					
AO347	Curve Point 50 X-Value					AI431					
AO348	Curve Point 50 Y-Value					AI432					
AO349	Curve Point 51 X-Value					AI433					
AO350	Curve Point 51 Y-Value					AI434					
AO351	Curve Point 52 X-Value					AI435					
AO352	Curve Point 52 Y-Value					AI436					
AO353	Curve Point 53 X-Value					AI437					
AO354	Curve Point 53 Y-Value					AI438					
AO355	Curve Point 54 X-Value					AI439					
AO356	Curve Point 54 Y-Value					AI440					
AO357	Curve Point 55 X-Value					AI441					
AO358	Curve Point 55 Y-Value					AI442					
AO359	Curve Point 56 X-Value					AI443					
AO360	Curve Point 56 Y-Value					AI444					
AO361	Curve Point 57 X-Value					AI445					
AO362	Curve Point 57 Y-Value					AI446					
AO363	Curve Point 58 X-Value					AI447					
AO364	Curve Point 58 Y-Value					AI448					
AO365	Curve Point 59 X-Value					AI449					
AO366	Curve Point 59 Y-Value					AI450					
AO367	Curve Point 60 X-Value					AI451					
AO368	Curve Point 60 Y-Value					AI452					
AO369	Curve Point 61 X-Value					AI453					
AO370	Curve Point 61 Y-Value					AI454					
AO371	Curve Point 62 X-Value					AI455					
AO372	Curve Point 62 Y-Value					AI456					
AO373	Curve Point 63 X-Value					AI457					
AO374	Curve Point 63 Y-Value					AI458					
AO375	Curve Point 64 X-Value					AI459					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO376	Curve Point 64 Y-Value					AI460					
AO377	Curve Point 65 X-Value					AI461					
AO378	Curve Point 65 Y-Value					AI462					
AO379	Curve Point 66 X-Value					AI463					
AO380	Curve Point 66 Y-Value					AI464					
AO381	Curve Point 67 X-Value					AI465					
AO382	Curve Point 67 Y-Value					AI466					
AO383	Curve Point 68 X-Value					AI467					
AO384	Curve Point 68 Y-Value					AI468					
AO385	Curve Point 69 X-Value					AI469					
AO386	Curve Point 69 Y-Value					AI470					
AO387	Curve Point 70 X-Value					AI471					
AO388	Curve Point 70 Y-Value					AI472					
AO389	Curve Point 71 X-Value					AI473					
AO390	Curve Point 71 Y-Value					AI474					
AO391	Curve Point 72 X-Value					AI475					
AO392	Curve Point 72 Y-Value					AI476					
AO393	Curve Point 73 X-Value					AI477					
AO394	Curve Point 73 Y-Value					AI478					
AO395	Curve Point 74 X-Value					AI479					
AO396	Curve Point 74 Y-Value					AI480					
AO397	Curve Point 75 X-Value					AI481					
AO398	Curve Point 75 Y-Value					AI482					
AO399	Curve Point 76 X-Value					AI483					
AO400	Curve Point 76 Y-Value					AI484					
AO401	Curve Point 77 X-Value					AI485					
AO402	Curve Point 77 Y-Value					AI486					
AO403	Curve Point 78 X-Value					AI487					
AO404	Curve Point 78 Y-Value					AI488					
AO405	Curve Point 79 X-Value					AI489					
AO406	Curve Point 79 Y-Value					AI490					
AO407	Curve Point 80 X-Value					AI491					
AO408	Curve Point 80 Y-Value					AI492					
AO409	Curve Point 81 X-Value					AI493					
AO410	Curve Point 81 Y-Value					AI494					
AO411	Curve Point 82 X-Value					AI495					
AO412	Curve Point 82 Y-Value					AI496					
AO413	Curve Point 83 X-Value					AI497					
AO414	Curve Point 83 Y-Value					AI498					
AO415	Curve Point 84 X-Value					AI499					
AO416	Curve Point 84 Y-Value					AI500					
AO417	Curve Point 85 X-Value					AI501					
AO418	Curve Point 85 Y-Value					AI502					
AO419	Curve Point 86 X-Value					AI503					
AO420	Curve Point 86 Y-Value					AI504					
AO421	Curve Point 87 X-Value					AI505					
AO422	Curve Point 87 Y-Value					AI506					
AO423	Curve Point 88 X-Value					AI507					
AO424	Curve Point 88 Y-Value					AI508					
AO425	Curve Point 89 X-Value					AI509					
AO426	Curve Point 89 Y-Value					AI510					
AO427	Curve Point 90 X-Value					AI511					
AO428	Curve Point 90 Y-Value					AI512					
AO429	Curve Point 91 X-Value					AI513					
AO430	Curve Point 91 Y-Value					AI514					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO431	Curve Point 92 X-Value					AI515					
AO432	Curve Point 92 Y-Value					AI516					
AO433	Curve Point 93 X-Value					AI517					
AO434	Curve Point 93 Y-Value					AI518					
AO435	Curve Point 94 X-Value					AI519					
AO436	Curve Point 94 Y-Value					AI520					
AO437	Curve Point 95 X-Value					AI521					
AO438	Curve Point 95 Y-Value					AI522					
AO439	Curve Point 96 X-Value					AI523					
AO440	Curve Point 96 Y-Value					AI524					
AO441	Curve Point 97 X-Value					AI525					
AO442	Curve Point 97 Y-Value					AI526					
AO443	Curve Point 98 X-Value					AI527					
AO444	Curve Point 98 Y-Value					AI528					
AO445	Curve Point 99 X-Value					AI529					
AO446	Curve Point 99 Y-Value					AI530					
AO447	Curve Point 100 X-Value					AI531					
AO448	Curve Point 100 Y-Value					AI532					
AO449	System Meter Active Power High Threshold					AI557			1		
AO450	System Meter Active Power Low Threshold					AI558			1		
AO451	System Meter Reactive Power High Threshold					AI559			1		
AO452	System Meter at Reactive Power Low Threshold					AI560			1		
AO453	System Meter at Power Factor High Threshold					AI561			0.01		
AO454	System Meter at Power Factor Low Threshold					AI562			0.01		
AO455	System Meter Phase A Volts High Threshold					AI563			0.1		
AO456	System Meter Phase A Volts Low Threshold					AI564			0.1		
AO457	System Meter Phase B Volts High Threshold					AI565			0.1		
AO458	System Meter Phase B Volts Low Threshold					AI566			0.1		
AO459	System Meter Phase C Volts High Threshold					AI567			0.1		
AO460	System Meter Phase C Volts Low Threshold					AI568			0.1		
AO461	Schedule to Edit Selector					AI570					
AO462	Selected Schedule Idenity					AI571					
AO463	Selected Schedule Priority					AI572					
AO464	Selected Schedule Type					AI573					
AO465	Selected Schedule Start Date					AI574					
AO466	Selected Schedule Start Time					AI575					
AO467	Selected Schedule Repeat Interval					AI576					
AO468	Selected Schedule Repeat Interval Units					AI577					
AO469	Selected Schedule Number of Points										
AO470	Schedule Point 1 Time Offset					AI581					
AO471	Schedule Point 1 Value					AI582					
AO472	Schedule Point 2 Time Offset					AI583					
AO473	Schedule Point 2 Value					AI584					
AO474	Schedule Point 3 Time Offset					AI585					
AO475	Schedule Point 3 Value					AI586					
AO476	Schedule Point 4 Time Offset					AI587					
AO477	Schedule Point 4 Value					AI588					
AO478	Schedule Point 5 Time Offset					AI589					
AO479	Schedule Point 5 Value					AI590					
AO480	Schedule Point 6 Time Offset					AI591					
AO481	Schedule Point 6 Value					AI592					
AO482	Schedule Point 7 Time Offset					AI593					
AO483	Schedule Point 7 Value					AI594					
AO484	Schedule Point 8 Time Offset					AI595					
AO485	Schedule Point 8 Value					AI596					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO486	Schedule Point 9 Time Offset					AI597					
AO487	Schedule Point 9 Value					AI598					
AO488	Schedule Point 10 Time Offset					AI599					
AO489	Schedule Point 10 Value					AI600					
AO490	Schedule Point 11 Time Offset					AI601					
AO491	Schedule Point 11 Value					AI602					
AO492	Schedule Point 12 Time Offset					AI603					
AO493	Schedule Point 12 Value					AI604					
AO494	Schedule Point 13 Time Offset					AI605					
AO495	Schedule Point 13 Value					AI606					
AO496	Schedule Point 14 Time Offset					AI607					
AO497	Schedule Point 14 Value					AI608					
AO498	Schedule Point 15 Time Offset					AI609					
AO499	Schedule Point 15 Value					AI610					
AO500	Schedule Point 16 Time Offset					AI611					
AO501	Schedule Point 16 Value					AI612					
AO502	Schedule Point 17 Time Offset					AI613					
AO503	Schedule Point 17 Value					AI614					
AO504	Schedule Point 18 Time Offset					AI615					
AO505	Schedule Point 18 Value					AI616					
AO506	Schedule Point 19 Time Offset					AI617					
AO507	Schedule Point 19 Value					AI618					
AO508	Schedule Point 20 Time Offset					AI619					
AO509	Schedule Point 20 Value					AI620					
AO510	Schedule Point 21 Time Offset					AI621					
AO511	Schedule Point 21 Value					AI622					
AO512	Schedule Point 22 Time Offset					AI623					
AO513	Schedule Point 22 Value					AI624					
AO514	Schedule Point 23 Time Offset					AI625					
AO515	Schedule Point 23 Value					AI626					
AO516	Schedule Point 24 Time Offset					AI627					
AO517	Schedule Point 24 Value					AI628					
AO518	Schedule Point 25 Time Offset					AI629					
AO519	Schedule Point 25 Value					AI630					
AO520	Schedule Point 26 Time Offset					AI631					
AO521	Schedule Point 26 Value					AI632					
AO522	Schedule Point 27 Time Offset					AI633					
AO523	Schedule Point 27 Value					AI634					
AO524	Schedule Point 28 Time Offset					AI635					
AO525	Schedule Point 28 Value					AI636					
AO526	Schedule Point 29 Time Offset					AI637					
AO527	Schedule Point 29 Value					AI638					
AO528	Schedule Point 30 Time Offset					AI639					
AO529	Schedule Point 30 Value					AI640					
AO530	Schedule Point 31 Time Offset					AI641					
AO531	Schedule Point 31 Value					AI642					
AO532	Schedule Point 32 Time Offset					AI643					
AO533	Schedule Point 32 Value					AI644					
AO534	Schedule Point 33 Time Offset					AI645					
AO535	Schedule Point 33 Value					AI646					
AO536	Schedule Point 34 Time Offset					AI647					
AO537	Schedule Point 34 Value					AI648					
AO538	Schedule Point 35 Time Offset					AI649					
AO539	Schedule Point 35 Value					AI650					
AO540	Schedule Point 36 Time Offset					AI651					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO541	Schedule Point 36 Value					AI652					
AO542	Schedule Point 37 Time Offset					AI653					
AO543	Schedule Point 37 Value					AI654					
AO544	Schedule Point 38 Time Offset					AI655					
AO545	Schedule Point 38 Value					AI656					
AO546	Schedule Point 39 Time Offset					AI657					
AO547	Schedule Point 39 Value					AI658					
AO548	Schedule Point 40 Time Offset					AI659					
AO549	Schedule Point 40 Value					AI660					
AO550	Schedule Point 41 Time Offset					AI661					
AO551	Schedule Point 41 Value					AI662					
AO552	Schedule Point 42 Time Offset					AI663					
AO553	Schedule Point 42 Value					AI664					
AO554	Schedule Point 43 Time Offset					AI665					
AO555	Schedule Point 43 Value					AI666					
AO556	Schedule Point 44 Time Offset					AI667					
AO557	Schedule Point 44 Value					AI668					
AO558	Schedule Point 45 Time Offset					AI669					
AO559	Schedule Point 45 Value					AI670					
AO560	Schedule Point 46 Time Offset					AI671					
AO561	Schedule Point 46 Value					AI672					
AO562	Schedule Point 47 Time Offset					AI673					
AO563	Schedule Point 47 Value					AI674					
AO564	Schedule Point 48 Time Offset					AI675					
AO565	Schedule Point 48 Value					AI676					
AO566	Schedule Point 49 Time Offset					AI677					
AO567	Schedule Point 49 Value					AI678					
AO568	Schedule Point 50 Time Offset					AI679					
AO569	Schedule Point 50 Value					AI680					
AO570	Schedule Point 51 Time Offset					AI681					
AO571	Schedule Point 51 Value					AI682					
AO572	Schedule Point 52 Time Offset					AI683					
AO573	Schedule Point 52 Value					AI684					
AO574	Schedule Point 53 Time Offset					AI685					
AO575	Schedule Point 53 Value					AI686					
AO576	Schedule Point 54 Time Offset					AI687					
AO577	Schedule Point 54 Value					AI688					
AO578	Schedule Point 55 Time Offset					AI689					
AO579	Schedule Point 55 Value					AI690					
AO580	Schedule Point 56 Time Offset					AI691					
AO581	Schedule Point 56 Value					AI692					
AO582	Schedule Point 57 Time Offset					AI693					
AO583	Schedule Point 57 Value					AI694					
AO584	Schedule Point 58 Time Offset					AI695					
AO585	Schedule Point 58 Value					AI696					
AO586	Schedule Point 59 Time Offset					AI697					
AO587	Schedule Point 59 Value					AI698					
AO588	Schedule Point 60 Time Offset					AI699					
AO589	Schedule Point 60 Value					AI700					
AO590	Schedule Point 61 Time Offset					AI701					
AO591	Schedule Point 61 Value					AI702					
AO592	Schedule Point 62 Time Offset					AI703					
AO593	Schedule Point 62 Value					AI704					
AO594	Schedule Point 63 Time Offset					AI705					
AO595	Schedule Point 63 Value					AI706					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO596	Schedule Point 64 Time Offset					AI707					
AO597	Schedule Point 64 Value					AI708					
AO598	Schedule Point 65 Time Offset					AI709					
AO599	Schedule Point 65 Value					AI710					
AO600	Schedule Point 66 Time Offset					AI711					
AO601	Schedule Point 66 Value					AI712					
AO602	Schedule Point 67 Time Offset					AI713					
AO603	Schedule Point 67 Value					AI714					
AO604	Schedule Point 68 Time Offset					AI715					
AO605	Schedule Point 68 Value					AI716					
AO606	Schedule Point 69 Time Offset					AI717					
AO607	Schedule Point 69 Value					AI718					
AO608	Schedule Point 70 Time Offset					AI719					
AO609	Schedule Point 70 Value					AI720					
AO610	Schedule Point 71 Time Offset					AI721					
AO611	Schedule Point 71 Value					AI722					
AO612	Schedule Point 72 Time Offset					AI723					
AO613	Schedule Point 72 Value					AI724					
AO614	Schedule Point 73 Time Offset					AI725					
AO615	Schedule Point 73 Value					AI726					
AO616	Schedule Point 74 Time Offset					AI727					
AO617	Schedule Point 74 Value					AI728					
AO618	Schedule Point 75 Time Offset					AI729					
AO619	Schedule Point 75 Value					AI730					
AO620	Schedule Point 76 Time Offset					AI731					
AO621	Schedule Point 76 Value					AI732					
AO622	Schedule Point 77 Time Offset					AI733					
AO623	Schedule Point 77 Value					AI734					
AO624	Schedule Point 78 Time Offset					AI735					
AO625	Schedule Point 78 Value					AI736					
AO626	Schedule Point 79 Time Offset					AI737					
AO627	Schedule Point 79 Value					AI738					
AO628	Schedule Point 80 Time Offset					AI739					
AO629	Schedule Point 80 Value					AI740					
AO630	Schedule Point 81 Time Offset					AI741					
AO631	Schedule Point 81 Value					AI742					
AO632	Schedule Point 82 Time Offset					AI743					
AO633	Schedule Point 82 Value					AI744					
AO634	Schedule Point 83 Time Offset					AI745					
AO635	Schedule Point 83 Value					AI746					
AO636	Schedule Point 84 Time Offset					AI747					
AO637	Schedule Point 84 Value					AI748					
AO638	Schedule Point 85 Time Offset					AI749					
AO639	Schedule Point 85 Value					AI750					
AO640	Schedule Point 86 Time Offset					AI751					
AO641	Schedule Point 86 Value					AI752					
AO642	Schedule Point 87 Time Offset					AI753					
AO643	Schedule Point 87 Value					AI754					
AO644	Schedule Point 88 Time Offset					AI755					
AO645	Schedule Point 88 Value					AI756					
AO646	Schedule Point 89 Time Offset					AI757					
AO647	Schedule Point 89 Value					AI758					
AO648	Schedule Point 90 Time Offset					AI759					
AO649	Schedule Point 90 Value					AI760					
AO650	Schedule Point 91 Time Offset					AI761					

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
AO651	Schedule Point 91 Value					AI762					
AO652	Schedule Point 92 Time Offset					AI763					
AO653	Schedule Point 92 Value					AI764					
AO654	Schedule Point 93 Time Offset					AI765					
AO655	Schedule Point 93 Value					AI766					
AO656	Schedule Point 94 Time Offset					AI767					
AO657	Schedule Point 94 Value					AI768					
AO658	Schedule Point 95 Time Offset					AI769					
AO659	Schedule Point 95 Value					AI770					
AO660	Schedule Point 96 Time Offset					AI771					
AO661	Schedule Point 96 Value					AI772					
AO662	Schedule Point 97 Time Offset					AI773					
AO663	Schedule Point 97 Value					AI774					
AO664	Schedule Point 98 Time Offset					AI775					
AO665	Schedule Point 98 Value					AI776					
AO666	Schedule Point 99 Time Offset					AI777					
AO667	Schedule Point 99 Value					AI778					
AO668	Schedule Point 100 Time Offset					AI779					
AO669	Schedule Point 100 Value					AI780					

Spreadsheet Tab Name: *C*

Point	Name	Supported	Present	Group	Variation	Mapping	Quality	Value	Multiplier	Status	Note
C0	System Active Energy Delivered										
C1	System Active Energy Received										
C2	System Reactive Energy Delivered										
C3	System Reactive Energy Received										

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