

Procedure

Installer CSIP-AUS Commissioning Test

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Document Approval

	Position Title	Name	Date
Reviewer	Senior Future Network Engineer	Kevin Combe	22 May 2024
Reviewer	Specialist Architect	Julien Fournier	23 May 2024
Reviewer	Customer Development Manager, ED	Chris Masson	22 May 2024
Approver	Future Network and Planning Manager	Theodora Karastergiou	23 May 2024

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1. Definitions

The terms used within this manual are defined as follows:

Term	Definition
DEIP	Australia's Distributed Energy Integration Program steering committee supporting the adoption of CSIP-AUS for DNSPs.
CSIP-AUS	The Common Smart Inverter Profile for Australia, is an implementation guide for IEEE 2030.5 applicable to Australia. The CSIP-AUS can be downloaded from the ARENA DEIP interoperability steering committee website .
IEEE 2030.5	IEEE Standard for Smart Energy Profile Application Protocol
Utility Server	Jemena's CSIP-AUS compliant control server that inverters will be tested against

2. Acronyms

The acronyms used within this manual are defined as follows:

Acronym	Description
CEC	Clean Energy Council
CoES	Certificate of Electrical Safety
CSIP	Common Smart Inverter Profile
CSIP-AUS	The Common Smart Inverter Profile for Australia,
DRED	Demand Response Enabling Device
DEIP	Distributed Energy Integration Program
DER	Distributed Energy Resource
DNSP	Distributed Network Service Provider
DOE	Dynamic Operating Envelope
DUT	Device Under Test
IEEE	Institute of Electrical and Electronics Engineers
LFDI	Long Form Device Identification
MVP	Minimal Viable Product
V2G	Vehicle-to-Grid

3. Purpose

The purposes of this document are:

- to provide a consistent procedure for the Installer to perform CSIP-AUS commissioning test of site installed devices; and
- to validate successful interoperability between Jemena's Utility Server and site inverter CSIP-AUS communication software client installed onsite

This document covers site testing of inverter associated with solar generation only, and excludes battery or V2G generation. It will be reviewed regularly and amended as required to reflect changes in standards, the application of new technologies, changes to procedures and field experience, among other things.

4. Scope

The scope of this document is limited to the testing of **CEC approved CSIP-AUS Compliant inverter / gateway pair listing** and with their communication software clients that are compliant to IEEE 2030.5 CSIP-AUS, either hosted locally on the inverter or a gateway device or via a certified cloud connection to Jemena's Utility Server.

4.1 CSIP-AUS Communication Types

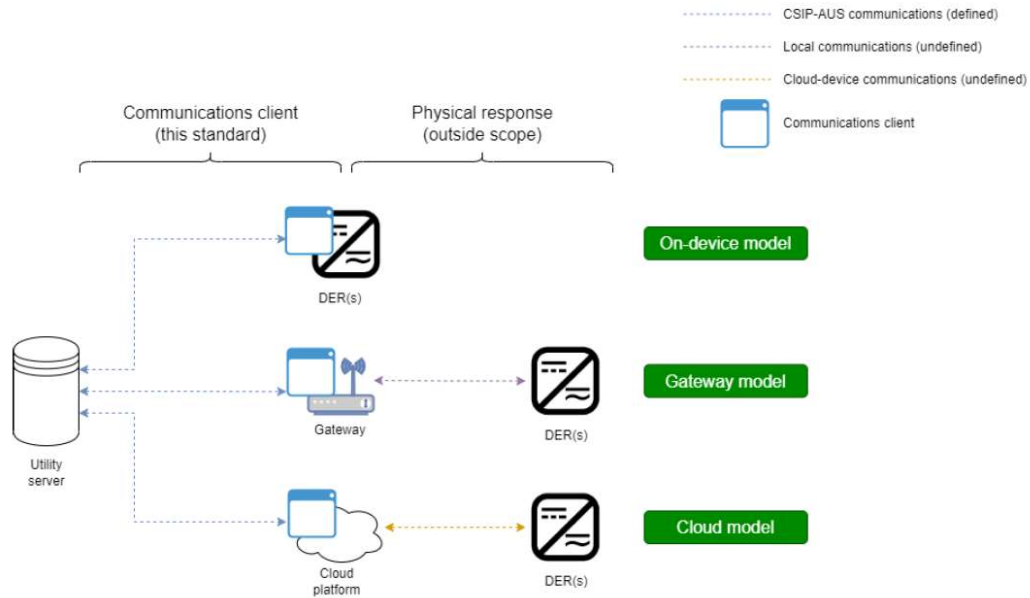


Figure 1 - CSIP-AUS Communication Types

4.2 DUT Types

CSIP-AUS is designed to cater for many different DER types of which the DUT itself will inform the Utility Server upon initial communication the capabilities of the device. As such only relevant tests are performed on the DUT that matches its capabilities.

A DUT can have one or multiple of the following capabilities;

1. DER Generator Capability
2. DER Load Capability
3. DRED Capability
4. Demand Response Generator
5. Demand Response Load

5. Responsibilities

Role	Responsibility
Jemena	<ul style="list-style-type: none"> Provides Production Utility Server for installer Provides testing requirements and criteria (this document) Perform and record test outcomes Administer communication software clients and inverters that pass or fail the test Technical support and resolve dispute
OEM	<ul style="list-style-type: none"> Provides registration details of the device to the Installer (i.e. LFDI) Communication and DUT enrolment support Testing troubleshooting support Support installer to apply correct default settings on inverter, e.g., set low static export on DUT
Installer	<ul style="list-style-type: none"> Registration of device with Jemena and OEM (Where applicable – i.e. LFDI, NMI, etc.) Jemena approved CSIP-AUS compliant system installed, connected and ready for commissioning with internet connection made available to DUT Support to Jemena's representative as required Ensure/Set low static export on DUT

Note: The Long Form Device Identification (LFDI) is required by the Utility Server to be registered to successfully authenticate communication with the DUT.

6. Process

The testing regime follows a four-step process:

1. Pre-commission checks and setup
2. Establish communication
3. Mandatory MVP testing
 - a. All DUT types
 - b. If DUT has generator capability
 - c. Stability tests
4. Confirmation of DUT commissioning test results

6.1 Pre-commission checks and setup (required)

1. Installer to ensure the DUT is electrically connected, setup correctly (AS 4777.2 Australia A settings and Low Static Export Limit set), powered on and has internet connectivity.
2. Installer to register DUT with OEM to receive the correct LFDI for registration with the Utility Server.
3. Installer proceeds to fill out a 'Commission My CSIP-Aus Inverter' application on Jemena's Electricity Distribution Portal (EDP) with all relevant completed documentation submitted (i.e. CoES, Licence Electrical Inspector approval, NMI, AS 4777.2 Australia A Settings screenshots, low static export set, LFDI, etc.)

<https://myservices.jemena.com.au/edp/login/auth>

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4. Jemena sends confirmation to the installer that the application has been received and installer needs to leave the DUT online, with active internet for Jemena to commence CSIP-AUS capability commission testing.

NOTE 1: If the device is offline or without internet connection from this point forward, it won't be able to establish communication with the utility server and will not undergo CSIP-AUS capability commission testing; a low static export will apply by default.

NOTE 2: Depending on the number of applications and weather conditions, it may take additional time for Jemena's CSIP-AUS commissioning team to commence testing.

6.2 Establish Communication (required)




Jemena's CSIP-AUS commissioning team register the DUT with the Utility Server and commence to establish communication. Refer to Appendix B for details.

6.3 Mandatory MVP Testing (required)

Jemena's CSIP-AUS commissioning team proceed with monitoring and energize tests for all DUT types. Refer to Appendix C.

6.4 Confirmation of DUT commissioning test results

Once Jemena has complete all the necessary tests and validation, Jemena will provide a response to the Applicant via the EDP, advising of commissioning result. Refer to below for possible outcomes.

	Status	Action	Limit
	Accept	Full exp limit available	5kW (per Ph)
	Accept with warning	Low static export limit	0.5kW
	Reject	Rectification required	Connection not permitted

6.5 Criteria used to determine pass or fails

Refer to Appendix D for details.

Jemena will record CSIP-Aus capability commissioning test outcomes as per Appendix A.

7. Related / Reference Documents

1. Government of South Australia, Technical Regulator Guideline. Link: [2022D066388-Technical-Regulator-Guidelines-Distributed-Energy-Resources-Version-1.5-1.pdf \(energymining.sa.gov.au\)](https://www.energymining.sa.gov.au/2022D066388-Technical-Regulator-Guidelines-Distributed-Energy-Resources-Version-1.5-1.pdf)
2. DEIP Interoperability Steering Committee Common Smart Inverter Profile – Australia - Test Procedures v1.0. Link: <https://bsgip.com/wp-content/uploads/2023/09/CSIP-AUS-Comms-Client-Test-Procedures-v1.0-final.pdf>
3. [IEEE 2030.5:2018](#)
4. [SA HB-218:2023](#)

Appendix A : Jemena’s record of CSIP-Aus Capability Commissioning Test outcomes – For Jemena to record

Date/ Time: _____
 Test Activity: _____
 Inverter OEM: _____
 Inverter Communication Software Client version: _____
 Inverter PollRate: _____
 Inverter PostRate: _____
 Overall assessment: Pass or Fail
 Overall comment: _____

Jemena Tester Name: _____ Signature: _____ Date: _____
 Jemena’s Approver Name: _____ Signature: _____ Date: _____

Details of individual CSIP-AUS test shall be recorded below.

Test	CSIP-AUS Test Record	Comments
Discovery – Monitoring Capability	The following telemetry readings through the Metering Mirror function set: Site Real Power (kW) _____ Site Reactive Power (kVAr) _____ Site Voltage (V) _____ Gross Inverter Real Power (kW) _____ Gross Inverter Reactive Power (kVAr) _____ Inverter Voltage (V) _____ The Status Information will capture attributes under: DERCapability _____ DERSettings _____ DERStatus _____ DERAvailability _____ AlarmStatus _____	For a Pass, minimum Metering Mirror function requirement are: - Site Real Power (kW) - Site Voltage (V) - Gross Inverter Real Power (kW) For a Pass, minimum Status information requirement are: - DERCapability o rtgMaxVA; or o rtgMaxW - DERSettings o setMaxVA; or o setMaxW - DERStatus o operationalModeStatus; and o genConnectStatus - DERAvailability o N/A (for BESS) - AlarmStatus o If available (Overcurrent, Over/Under Voltage, Over/Under Frequency)

Test	CSIP-AUS Test Record	Comments
Export Limit	<p>This test is intended to validate default export limit and active control export limit functions.</p> <p>PollRate applied: _____</p> <p>PostRate applied: _____</p> <p>Scheduled control duration: _____</p> <ul style="list-style-type: none"> Set the default OpModGenLimW= maximum inverter rating under commissioning (max DERCapability rtgMaxVA; or rtgMaxW of all devices under test) Set the default OpModExpLimW = 0.5kW Confirm site active power and generation are correct _____ Set an active OpModExpLimW = 0kW Confirm site active power export limit reduces to 0kW _____ <p>Confirm at end of scheduled control that site export limit returns to 0.5kW. Observe and record failsafe response time, that is, the duration from end of scheduled control to when the site export limit returns to 0.5kW _____</p> <ul style="list-style-type: none"> Set an active OpModExpLimW = 1.5kW Confirm site active power export limit increases to 1.5kW _____ <p>Confirm at end of scheduled control that site export limit returns to 0.5kW. Observe and record failsafe response time, that is, the duration from end of scheduled control to when the site export limit returns to 0.5kW _____</p> <p>Note: Depending on pollRate and postRate, the scheduled control time shall be set of at least 4 times to demonstrate each test. E.g. if the pollRate and postRate is set to 1 minute, then the scheduled control time shall be set to a duration of 4 minutes.</p>	<p>DefaultDERControl: OpModExpLimW DERControl: OpModExpLimW</p> <p>For a Pass, minimum requirements are inverters responded to the tests under a given weather condition.</p>
Generation Limit	<p>PollRate applied: _____</p> <p>PostRate applied: _____</p> <p>Scheduled control duration: _____</p> <p>This test is intended to validate active control generation limit function.</p> <ul style="list-style-type: none"> Set an active OpModGenLimW = 0kW Confirm inverter active power limit reduces to 0kW _____ 	<p>DERControl: OpModGenLimW</p> <p>For a Pass, minimum requirement is inverters responded to the test.</p>

Test	CSIP-AUS Test Record	Comments
	<p>Confirm at end of scheduled control that site export limit returns to 0.5kW. Observe and record failsafe response time, that is, the duration from end of scheduled control to when the site export limit returns to 0.5kW</p> <p>_____</p> <p>_____</p> <p>Note: Depending on pollRate and postRate, the scheduled control time shall be set of at least 4 times to demonstrate each test. E.g. if the pollRate and postRate is set to 1 minute, then the scheduled control time shall be set to a duration of 4 minutes.</p>	
Energize	<p>Confirm connection status of device Send OpModEnergize = False Confirm connection status</p> <p>_____</p> <p>_____</p> <p>Send OpModEnergize = True Confirm connection status</p> <p>_____</p> <p>_____</p> <p>At this point in time both cease to energize and disconnection are acceptable to pass this test.</p>	<p>DERControl: opModEnergize</p> <p>For a Pass, minimum requirement is inverters responded to the test.</p>

Appendix B : Establish Communication (required)

Jemena's CSIP-AUS commissioning team register the DUT with the Utility Server and commence to establish communication.

Test	Test Description	CSIP-AUS Mapping
Discovery	<p>This test is intended to validate the client's ability to perform discovery against the Utility Server and to establish basic IEEE 2030.5 - based communications. It includes monitoring, connection status, operational mode and device capability</p> <p>Jemena to note/record core and optional components available on the DUT.</p>	<p>The Status Information will capture attributes under:</p> <p>DERCapability DERSettings DERStatus DERAvailability</p>

1. If the Discovery test is successful and **subject to the DUT capability**; Jemena's CSIP-AUS commissioning team proceed to setup the polling / post rate for the DUT as outlined below

Resource	Value (secs)
DeviceCapability	300
EndDeviceList	300
FunctionSetAssignmentsList	300
DERProgramList	60
DERList (including DERStatus, DERSettings and DERCapability)	60
MirrorUsagePoint	60

Note: These values differ from the default values defined in CSIP-AUS in order to expedite the tests.

Appendix C : Mandatory MVP Testing (required)

Jemena's CSIP-AUS commissioning team proceed with monitoring and energize tests for all DUT types.

Test	Test Description	CSIP-AUS Mapping
Monitoring	This test is intended to validate the client's ability to post average values for the following readings using the MirrorMeterReading POST method	The following telemetry readings through the Metering Mirror function set: Site Real Power (kW) Site Reactive Power (kVAr) Site Voltage (V) Gross Inverter Real Power (kW) Gross Inverter Reactive Power (kVAr) Inverter Voltage (V) (if supported) Frequency (if supported)
Energize	Confirm energisation status of device Send OpModEnergize = False Confirm connection status Send OpModEnergize = True Confirm connection status At this point in time both cease to energize and disconnection are acceptable to pass this test..	DERControl: opModEnergize

1. DUT has DER Generator capability; Jemena's CSIP-AUS commissioning team proceed with functional tests.

Test	Test Description	CSIP-AUS Mapping
Site Export Limit	This test is intended to validate default export limit and active control export limit functions. <ul style="list-style-type: none"> Set the <i>default</i> OpModGenLimW= maximum inverter rating under commissioning (max DERCapability rtgMaxVA; or rtgMaxW of all devices under test) Set the <i>default</i> OpModExpLimW = 0.5kW Confirm site active power and generation are correct Set an active OpModExpLimW = 0kW Confirm site active power limit reduces to 0kW Confirm at end of scheduled control that site export limit returns to 0.5kW. Observe and record failsafe response time, that is, the duration from end of scheduled control to when the site export limit returns to 0.5kW Set an active OpModExpLimW = 1.5kW Confirm site active power limit increases to 1.5kW Confirm at end of scheduled control that site export limit returns to 0.5kW. Observe and record failsafe response time, that is, the duration from end of scheduled control to when the site export limit returns to 0.5kW <p>Note: Depending on pollRate and postRate, the scheduled control time shall be set of at least 4 times to demonstrate each test. E.g. if the pollRate and postRate is set to 1 minute, then the scheduled control time shall be set to a duration of 4 minutes.</p>	DefaultDERControl: OpModExpLimW DERControl: OpModExpLimW
Inverter Generation Limit	This test is intended to validate active control generation limit function. <ul style="list-style-type: none"> Set an active OpModGenLimW = 0kW Confirm inverter active power limit reduces to 0kW 	DERControl: OpModGenLimW

Test	Test Description	CSIP-AUS Mapping
	<ul style="list-style-type: none"> Confirm at end of scheduled control that site export limit returns to 0.5kW. Observe and record failsafe response time, that is, the duration from end of scheduled control to when the site export limit returns to 0.5kW <p>Note: Depending on pollRate and postRate, the scheduled control time shall be set of at least 4 times to demonstrate each test. E.g. if the pollRate and postRate is set to 1 minute, then the scheduled control time shall be set to a duration of 4 minutes.</p>	

2. Stability tests.

Test	Test Description	CSIP-AUS Mapping
Comms Stability	A connection between the utility server and client is established and maintained for 3 consecutive days (72 hours).	N/A

Appendix D : Criteria used to determine pass or fails

The following criteria shall be used to determine pass or fail.

Test	Expected Result	Failure Criteria	Implementation notes
Discovery	<p>Client communications with the Utility Server are initialised as appropriate by the client.</p> <p>Utility Server captures EndDevice information.</p> <p>Utility Server captures monitoring as per CSIP-AUS mapping through the Metering Mirror Function.</p> <p>Utility Server captures Status Information:</p> <ul style="list-style-type: none"> - Ratings (DERCapability) - Settings (DERSettings) - Operational Status (DERStatus) - Availability (DERAvailability) - Alarms (DERStatus) <p>The Client is time synced with the Utility Server.</p>	<p>Client does not perform discovery against the Utility Server.</p> <p>Client does not access the minimum function set or device capability required.</p> <p>Client becomes unsynchronised with the Utility Server and does not flag an error</p>	<p>Required monitoring data shall be 5-minute average and the inverter must be capable of ending this every 5-minutes.</p> <p>Arbitrary monitoring PostRates shall be supported to a minimum interval of 60s in alignment with the CSIP-AUS. This functionality may be utilised by the Utility Server during testing and the capability test.</p> <p>Where a client manages multiple DER under a single device, for the Meter Mirror Function the posted values shall be an aggregation of the DER under a device.</p> <p>Where a client manages multiple DER under a single device, for DERCapability, the posted values shall be a summation of the total controllable capacities of the DER under a device.</p> <p>Where a client manages multiple DER under a single device, for DERSettings, the posted values shall be a summation of the total controllable capacities of the DER under a device.</p>
Monitoring	<p>The client completes the discovery process as detailed, including receiving the MirrorUsagePoint resource link from the utility server.</p> <p>Client requests & utility sends resource information from the utility server's MirrorUsagePointList endpoint.</p> <p>The client posts MirrorMeterReading or MirrorMeterReadingList payloads to the MirrorUsagePointList endpoint at the configured interval, including all of the required and claimed data points as described above</p>	<p>The client does not post readings to the utility server.</p> <p>The client fails to post minimum data set required.</p> <p>The client posts readings at an incorrect interval, with acceptable tolerances of +/- 5 minutes accuracy.</p>	<p>It has been noted that there are multiple ways a client can configure one or more MirrorUsagePoint resources for a site, and that different utility servers may require different configurations. This test validates that the MirrorUsagePoint resources are configured in a functional way, and does not specify which configuration is to be supported. <i>Clarification on an intended configuration is expected to be provided in a future revision to CSIP-AUS.</i></p> <p>The averaging window of data reported SHALL match the configured MirrorUsagePoint postRate.</p> <p>Where a client manages multiple DER under a single device, for MirrorMeterReading, the posted values shall be a summation of the total controllable capacities of the DER under a device.</p>

Test	Expected Result	Failure Criteria	Implementation notes
Energize	<p>The utility sever configures an active DERControl: opModEnergize.</p> <p>On the next poll of the Utility Server, the client receives and starts the updated active DERControl: opModEnergize and updates DERStatus to confirm the status of the device.</p> <p>Following the completion of the active DERControl the device updates the DERStatus to confirm the status of the device.</p>	<p>The device does not de-energise and re-energise the device.</p> <p>The device status is not updated.</p> <p>At this point in time both cease to energize and disconnection are acceptable to pass this test.</p>	Where a client manages multiple DER under a single device, all managed DER are expected to energise / re-energise when instructed.
Site Export Limit	<p>The utility server configures an active DERControl: OpModExpLimW.</p> <p>On the next poll of the Utility Server, the client receives and starts the updated active DERControl: OpModExpLimW.</p> <p>Following the completion of the active DERControl, the device reverts back to the DefaultDERControl: OpModExpLimW.</p>	<p>The device does not change export power to the scheduled active DERControl.</p> <p>The device does not revert to the DefaultDERControl once the schedules active DERControl is complete.</p>	Where a client manages multiple DER under a single device, the export limit control is the total site export, and the client shall portion this across the DER downstream of the controllable device to comply with the control.
Generation Limit	<p>The utility server configures an active DERControl: OpModGenLimW.</p> <p>On the next poll of the Utility Server, the client receives and starts the updated active DERControl: OpModGenLimW.</p> <p>Following the completion of the active DERControl, the device reverts back to the DefaultDERControl: OpModExpLimW.</p>	<p>The device does not change the generator power to the scheduled active DERControl.</p> <p>The device does not revert to the DefaultDERControl once the schedules active DERControl is complete.</p>	Where a client manages multiple DER under a single device, the generation limit control is the aggregated generation, and the client shall portion this across the DER downstream of the controllable device.
Subscription/ Notification	<p>The Utility Server configures an active control (all tests above) that is 5 minutes in the future and notifies the client of this control.</p> <p>The client receives and commences the active control.</p>	The device does not commence the active control.	
Comms Stability	A connection between the utility server and client is established and maintained for 3 consecutive days (72 hours).	Communications are not maintained throughout the specified period.	Clients that cannot be configured to always be online due to a reliance on a variable power source (e.g. sunlight) may lose maintain communications when the source is unavailable (e.g. outside daylight hours) however DUT is expected to maintain communications when the power source is available.