

Guide to DERR APIs

1.0 Final April 2020

Pre-production: Wednesday, 5 Feb 2020

Production: Thursday, 13 Feb 2020

Important Notice

PURPOSE & AUDIENCE

This document describes the APIs available to participants for submitting and retrieving data to the DER Register .

HOW TO USE THIS DOCUMENT

- If you have questions about the business aspects of these changes, please see Consultations on [AEMO's website](#).
- The references listed throughout this document are primary resources and take precedence over this document.
- Unless otherwise stated, you can find resources mentioned in this guide on AEMO's website.
- **Text in this format** is a link to related information.
- **Text in this format**, indicates a reference to a document on [AEMO's website](#).
- **Text in this format** is an action to perform in the MSATS Web Portal.
- This document is written in plain language for easy reading. Where there is a discrepancy between the Rules and information or a term in this document, the Rules take precedence.
- Glossary Terms are capitalised and have the meanings listed against them in the **Glossary**.
- *Italicised terms* are defined in the Rules. Any rules terms not in this format still have the same meaning.

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VERSION HISTORY

- 0.01 Created Guide to DERR APIs.
- 0.02 Added sections for authorisation for Account-holders.
- 0.03 Updated API descriptions, added permissible values and added Account-holder login and token API information.
- 0.04 Reverted reactivePowerRegulation values to **Voltage droop** and **Fixed power factor**.
- 0.05–0.10 Added the logout API endpoint, Added diagram showing logical flow of a typical session. Improved the descriptions of requestAccessToken and refreshAccessToken. Substantially clarified field descriptions in 3.2.2 and 4.5.2. Corrected values for nspAcknowledged.
- 1.0 Added new parameters for Logout API, Corrected DeviceType & Sub-Type values

DOCUMENTS MADE OBSOLETE

The release of this document changes only the version of Guide to DERR APIs.

SUPPORT HUB

To contact AEMO's Support Hub use [Contact Us](#) on AEMO's website or Phone: 1300 AEMO 00 (1300 236 600) and follow the prompts.

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1. Introduction

This document provides details of the APIs developed for the DER project. The guide will help participants develop applications that will interface with AEMO system.

Separate documentation describes the interfaces AEMO is creating to enable participants to access the system and provide information to the DER Register system via a web interface and the APIs, while this guide describes these APIs in detail.

1.1 Audience

AEMO provides this information to inform business analysts and IT staff in participant organisations.

- The primary audience is Network Service Providers and Account-holders.
- The secondary audience is AEMO Operations, Forecasting and Technology teams.

1.2 Assumed reading and context

This Guide to DERR APIs assumes a working knowledge of the following documents that have been published in relation to the DER Register:

- Guide to AEMO's e-hub APIs;
- DER Register Information Guidelines; and
- DER Register Final Report.

These documents, and other reference and background material, can be found on the AEMO website at <https://aemo.com.au/Electricity/National-Electricity-Market-NEM/DER-program/DER-Register-Implementation>.

1.3 Assumed knowledge

This guide assumes you have knowledge of RESTful programming architecture.

1.4 Schedule

Scheduled for implementation in:

- Pre-production: Wednesday, 5 Feb 2020
- Production: Thursday, 13 Feb 2020

2. DER APIs – Standards

2.1 API Access

AEMO's DER APIs are exposed through the internet via an API gateway.

This section provides a high-level overview of the DER register APIs that NSPs can use to build their own applications to submit and access DER data.

API details, including Swagger files are available via AEMO's API Portal.

2.2 API authentication and authorisation

Authentication

API connections use mTLS certificates to secure the transport layer with encrypted communication and secure interactions between participants' and AEMO's systems.

For details on the steps to obtain a certificate, see Section 4.2 of **Guide to AEMO's APIs**.

- AEMO issues mTLS certificates to participants (NSPs) on request.
- Account-holders connect to the AEMO DER APIs using a TLS connection. Authentication for Account-holders is via one way SSL.

Note: Account-holders must register to use and create an app, before they can use the DER APIs. For more information, see **Registering to use the AEMO API Portal** and **Creating an app for DER APIs**.

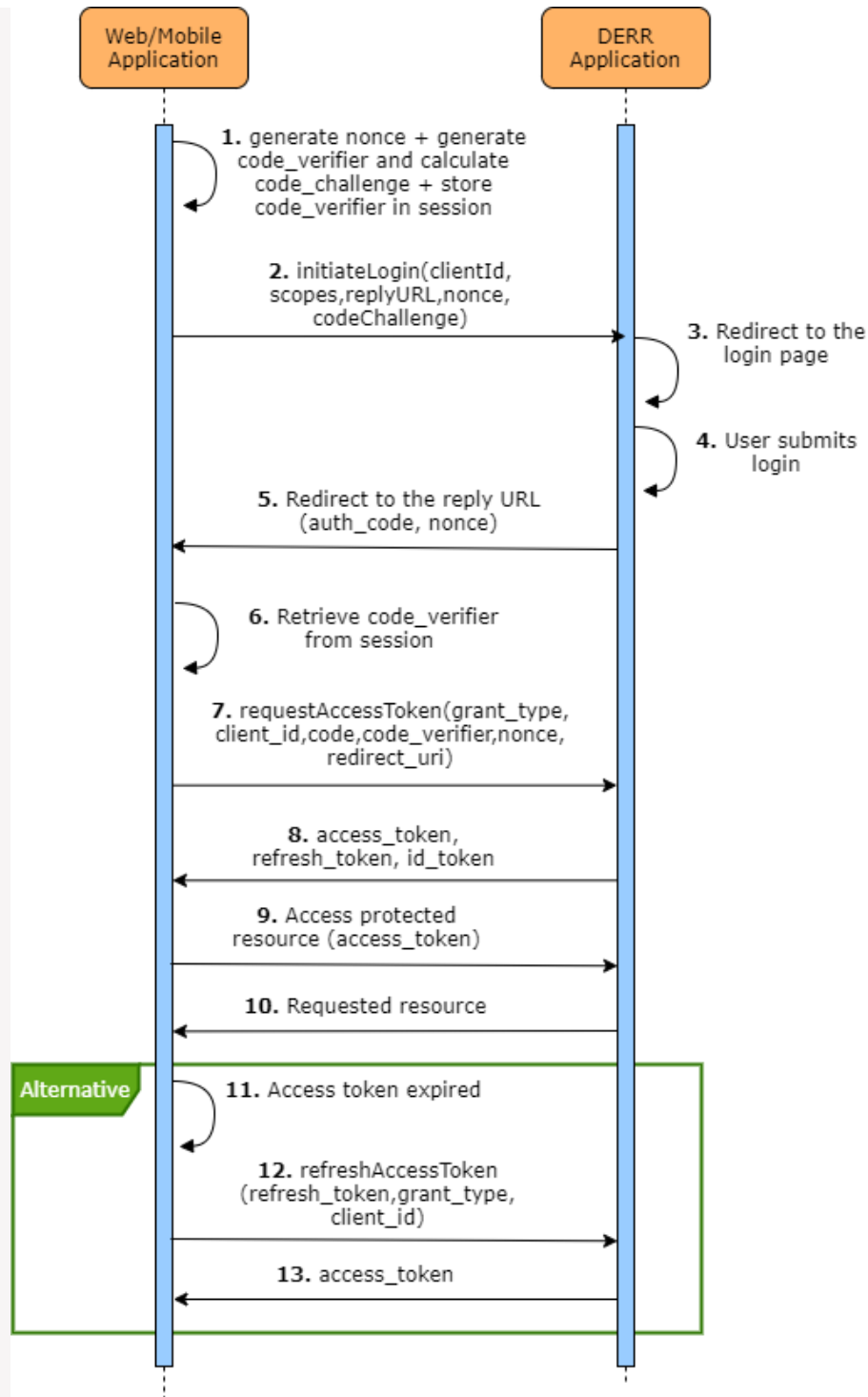
Authorisation

API calls for NSPs are authorised by Basic HTTP authentication using a username and password assigned by the company's Participant Administrator.

For more information about user rights creating new Participant Users and assigning rights, see **Guide to User Rights Management (URM)**.

Authentication sequence

The logical flow of a typical session is as shown in this diagram.



For discussions of the terms used in the diagram, see the body of this manual.

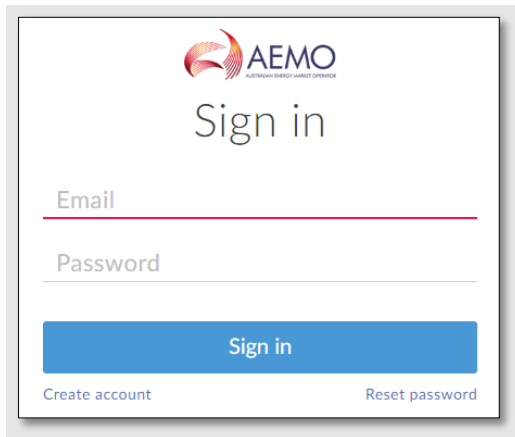
2.2.1 Registering to use the AEMO API Portal

Before the Account-holders can use the AEMO DER APIs to submit and receive data to/from the DER Register, they must register to use the API Portal.

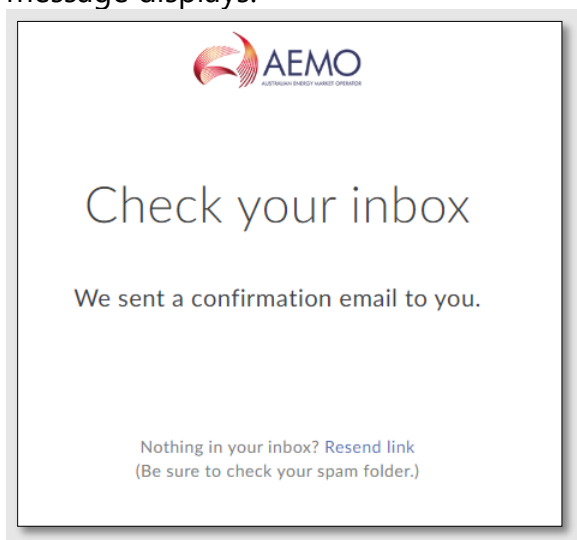
Note: Account-holders can register a single login to manage all their installers.

To register, use the following steps:

1. In a web browser, type in this URL: <https://dev.aemo.com.au/>
The **AEMO API Portal** displays.
2. From the top-right, click **Sign In**. The **Sign In** page displays.

A screenshot of the AEMO Sign in page. At the top is the AEMO logo (Australian Energy Market Operator). Below the logo is the text "Sign in". There are two input fields: "Email" and "Password". Below the "Password" field is a blue "Sign in" button. At the bottom left is a link "Create account" and at the bottom right is a link "Reset password".

3. Click **Create account**. The **Create your account** page displays.
4. Enter your name, email address, company and password.
5. Tick the **I agree to the terms** box and click **Create Account**.
You will receive an email to verify your submitted details. The following message displays.



Note: An email is also sent to AEMO for approval. You cannot sign into the API Portal until AEMO approves your registration.

Timeframe for AEMO approval:

- For registration approvals raised within business working hours (9am to 5pm), AEMO will approve the registration within 1 hour.
- For all registration approvals outside business hours, AEMO will approve the registration the next business day.

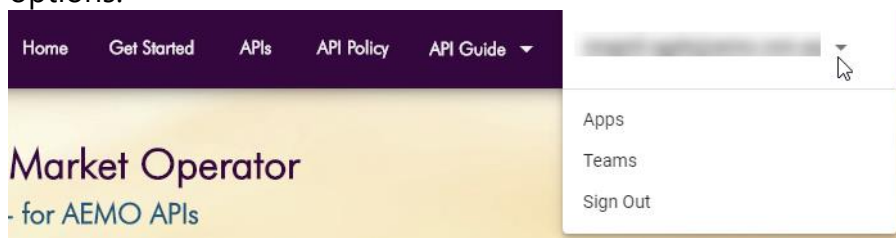
6. Once your registration is approved, you will receive an email from AEMO.
7. Log in using your registered email address and password.

2.2.2 Creating an app for DER APIs

Once you have registered to use the AEMO API Portal, you can create an app to use the DER APIs.

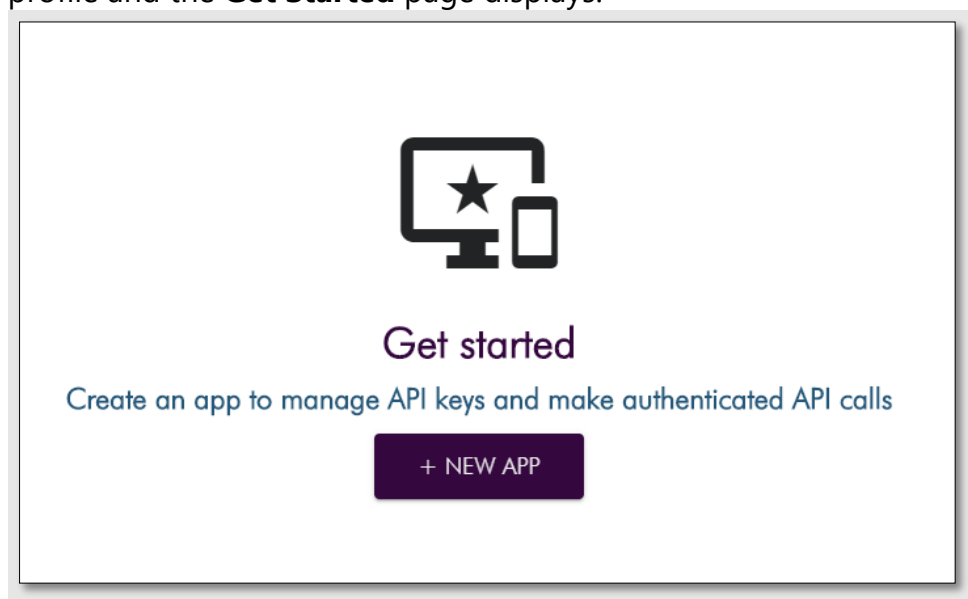
To create an app:

1. From the AEMO API Portal top menu, click your login id to view additional options.



2. Click **Apps** from the options. The Apps page displays.

If this is your first time using this Portal, you will have no apps registered for your profile and the **Get Started** page displays.



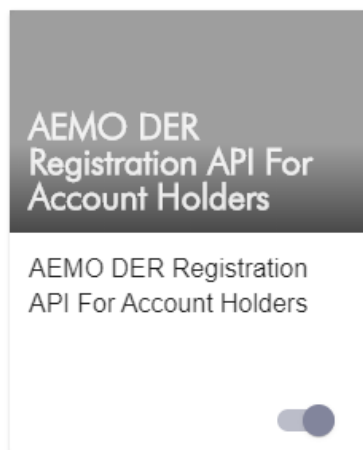
If you have used the Portal before, you should see the apps registered for your account.

3. Click **NEW APP**. The New App page displays.

4. Enter the App Name and a description.

Tip: We recommend using a combination of your organisation name and DER to identify your app. For example, XYZ – DER

5. From the list of APIs, toggle the **AEMO-DER-Registration-API-For-Account-Holders**.



6. To create your app, click **Create**. An email is sent to AEMO for approval.
7. Once AEMO approves the app, you can view the app details. The API Keys are automatically generated and the status is now **Active**.

Overview

App Name *
Swap - DERR

Description
DER Test

App ID
cfa04b46-79a7-4116-9f37-a2813e175aef

Owner
Me ()

API Keys

Key	Secret	Status	Created	Expires
jdfY6pRM71u1stYTzV99EVuT...	Show	Active	2019-11-28	never

[ADD KEY](#)

2.3 API format

The DER Register API URL design follows AEMO's e-Hub API standards. You can access the DER Register APIs only via the public internet as part of first release. DER Register API endpoints will have the following format:

[/NEMWholesale/DER/registration/v1](#)

Example URL for DER Register (B2B - NSPs)

Environment	Internet Address
Pre-production base URL	https://partner.api.preprod.aemo.com.au
Production base URL	https://partner.api.aemo.com.au/

Example URL for DER Register (B2C – For Account-holders)

Environment	Internet Address
Pre-production base URL	https://api.preprod.aemo.com.au/
Production base URL	https://api.aemo.com.au/

2.3.1 API naming

The DER APIs follow a verb/noun naming convention, for clear understanding of their action.

2.4 Response Codes

Data Condition	Value	Examples/Remarks
Successful response	200	200 OK
HTTP Technical Failure	Appropriate HTTP Response Code	400 Failed Bad post data.
Invalid Credentials	401	401 Unauthorized. { "Exception": "Unauthorized:Invalid UserName or Password" }
No Username / Password details in HTTP request	401	401 Unauthorized { "Exception": "Unauthorized:Invalid UserName or Password" }
Business validation error	422	422 Failed The request was well formed but the submitted content failed business validation rules.
Application Unavailable (down)	500	500 Application Unavailable

2.4.1 Examples: HTTP response code 404, 405, 500

The e-Hub sends an appropriate HTTP response code and description when any of the technical validations fail. In such instances, the e-Hub also sends additional information about the validation failure in the <exception payload> as shown below.

Response code 405 example

```

HTTP/1.1 405 Method Not Allowed
Content-Length: nnn
Date: Mon, 01 May 2017 18:00:00 GMT
Connection: close
Content-Type: application/json

{
  "transactionId": "<GUID>",
  "data": {
  },
  "errors": [
    {
      "code": 405,
      "title": "Not Found",
      "detail": "Input request HTTP method is <Invalid Method passed>
                but operation <Resource Name>
                accepts only: [<Valid Method>]",
      "source": null
    }
  ]
}

```

Response code 404 example

```

HTTP/1.1 404 Resource Not Found
Content-Length: nnn
Date: Mon, 01 May 2017 18:00:00 GMT
Connection: close
Content-Type: application/json

{
  "transactionId": "<GUID>",
  "data": {
  },
  "errors": [
    {
      "code": 404,
      "title": "Not Found",
      "detail": "Resources for the endpoint URI not found.
                Endpoint URI: <Resource>",
      "source": null
    }
  ]
}

```

Response code 500 example

```

HTTP/1.1 500 <As per the validation failure>
Content-Length: nnn
Date: Mon, 01 May 2017 18:00:00 GMT
Connection: close

{
  "transactionId": "<GUID>",
  "data": {
  },
  "errors": [
    {
      "code": 500,
      "title": "<As per the validation failure>",
      "detail": "<As per the validation failure>",
      "source": null
    }
  ]
}

```

2.5 Payload compression

AEMO APIs support HTTP protocol compression controlled by the HTTP request header attributes, allowing compression before sending and responding. For more information, refer to Content-Encoding and Accept-Encoding in the next section.

2.6 Request headers

Standard HTTP request header attributes.

Parameter	Value(s)	Description
Content-Type	application/json	Content format. This is mandatory.
Content-Length		This is mandatory.
Content-Encoding	gzip compress deflate	Specifies any compression applied to the request body.
Accept	application/json	Details the expected content type of the response
Accept-Encoding	gzip compress deflate	Specifies the encoding supported for the response
X-initiatingParticipantID	<PID>	The participant ID who the request is from. This is mandatory.

Parameter	Value(s)	Description
X-market	NEM	The market the request is for. This is mandatory.
Authorisation	Basic QFhQVC0wMDAwMzoyZ WRmOGJhYS0wY2I0LTQ wZj ctOTlyMS0yODUxNmM4 N2MxNjQ= Note: This is an example only.	Base64 encoding of the URM username and password, concatenated with a colon. This is mandatory.

2.7 List of DER APIs

This section describes the APIs to create, maintain and update a DER register.

API Name	Support Method	Entity Description
submitDER	POST	Submit a single DER record. The return response includes AC Connection ID, DER Device ID with the current status and exceptions, if any. This API is used for creating, updating, and handling exceptions for a DER Record.
submitPreferences	POST	Submit default inverter settings, notification preference and contact details.
getPreferences	GET	Retrieve default inverter settings, notification preference and contact details.
getDERSummary	POST	Retrieve latest version single or multiple DER Record as per parameters supplied.
getDER	POST	Retrieve full history/versions of a single or multiple DER Records. File Limit to be confirmed
grantJobAccess	POST	Grant/Block access to Account-holder for specific DER Job.
requestJobAccess	POST	Account-holder requests access to a DER job.
getReceipts	POST	Retrieve receipts for a single DER Record
Login, logout and Access Token APIs		
initiateLogin	GET	Redirect the Account-holder to the login page, where they can register or log in (if already registered).

API Name	Support Method	Entity Description
requestAccessToken	POST	Return an access token, access token expiry time in seconds, Id token, refresh token and refresh token expiry time in seconds after a successful authentication.
refreshAccessToken	POST	Get a new access token when the existing access token has expired
logout	GET	Invalidate the current user session and redirect the user to the login page.

2.8 Installation stage

(Also known as DER Record Status.)

Status	Description
Idle	When a record is "initial" for 365 days, it becomes idle.
Initial	AC Connection record exists but it is not yet physically installed or operating.
Conditional	AC Connection record exist and physically was/is installed and operating.
Confirmed	AC Connection record exist and physically was/is installed and operating.

2.9 POST API response compression

DER Register POST APIs should have a compressed payload.

Parameter	Value(s)
Content-Type	Must be: application/json
Content-Encoding	Should be at least one of: gzip compress deflate If not provided no compression is assumed.
Accept-Encoding	Should be at least one of: gzip compress deflate If not provided no compression is assumed.

2.10 GET API response compression

DER Register GET APIs provide a compressed successful response.

Parameter	Value(s)
Content-Type	application/json
Content-Encoding	Depends on the Accept-Encoding in the request. It should be one of: gzip compress deflate If not provided no compression is assumed.

2.11 Throttling

AEMO implements throttling on API calls. Throttling is set at:

- 1000 requests per participant per minute for account holders.
- 6000 requests per participant per minute for NSPs.

3. NSP APIs

3.1 Design

Using the JSON format, NSPs can:

- Submit DER Connection Agreement data.
- Provide AC Connections, and Device details in the same submission.

AEMO believes the proposed JSON format:

- Makes the process of building DER systems less costly and easier to test for new participants/vendors, enabling leveraging of modern technologies that natively support JSON.
- Makes validation in AEMO's and participants' systems easier to implement and support; the formats would allow schema validation based on submission type.
- Makes the technical specification clearer and easier to understand, avoiding format misunderstandings.

3.2 POST submitDER

3.2.1 Description

Participants can submit a single DER Record data at any stage of the process. They can also use this API to:

- Submit Connection Agreement,
- Update an existing DER record,
- Resolve exceptions.

3.2.2 Request

Item	Value
URL Path	/submitDER
Method	POST
Header	Standard request header attributes, be sure to include: Authorization: Basic Content-Encoding: Should be one of [gzip, deflate, compress] Accept-Encoding: Should be one or more of [gzip, deflate, compress]

Body

```

{
  "data" :
  {
    "nmi" : "string",
    "jobNumber" : "string",
    "approvedCapacity": "number",
    "availablePhasesCount" : "number",
    "installedPhasesCount": "number",
    "islandableInstallation" : "string",
    "centralProtectionControl" : "string",
    "exportLimitkva" : "number",
    "underFrequencyProtection" : "number",
    "underFrequencyProtectionDelay" : "number",
    "overFrequencyProtection" : "number",
    "overFrequencyProtectionDelay" : "number",
    "underVoltageProtection" : "number",
    "underVoltageProtectionDelay" : "number",
    "overVoltageProtection" : "number",
    "overVoltageProtectionDelay" : "number",
    "sustainedOverVoltage" : "number",
    "sustainedOverVoltageDelay" : "number",
    "frequencyRateOfChange" : "number",
    "voltageVectorShift" : "number",
    "interTripScheme" : "string",
    "neutralVoltageDisplacement" : "number",
    "installerId" : "string",
    "submitMode" : "string",
    "comments" : "string",
    "acConnections":
    [
      {
        "connectionId" : "number",
        "nspConnectionId" : "string",
        "commissioningDate" : "string",
        "equipmentType" : "string",
        "count" : "number",
        "statusCode" : "string",
        "frequencyRateOfChange" : "number",
        "voltageVectorShift" : "number",
        "interTripScheme" : "string",
        "neutralVoltageDisplacement" : "number",
        "details" :
        {
          "dredInverterInteraction" : "string",
          "serialNumbers" : ["string"],
          "manufacturerName" : "string",
          "modelName" : "string",
          "inverterSeries" : "string",
          "inverterStandard" : "string",
          "inverterDeviceCapacity" : "number",
          "sustainOpOvervoltLimit" : "number",
          "stopAtOverFreq" : "number",
          "stopAtUnderFreq" : "number",
          "invVoltWattRespMode" : "string",

```

```

"invWattRespV1" : "number",
"invWattRespV2" : "number",
"invWattRespV3" : "number",
"invWattRespV4" : "number",
"invWattRespPAtV1" : "number",
"invWattRespPAtV2" : "number",
"invWattRespPAtV3" : "number",
"invWattRespPAtV4" : "number",
"invVoltVarRespMode" : "string",
"invVarRespV1" : "number",
"invVarRespV2" : "number",
"invVarRespV3" : "number",
"invVarRespV4" : "number",
"invVarRespQAtV1" : "number",
"invVarRespQAtV2" : "number",
"invVarRespQAtV3" : "number",
"invVarRespQAtV4" : "number",
"invReactivePowerMode" : "string",
"invFixReactivePower" : "number",
"fixPowerFactorMode" : "string",
"fixPowerFactor" : "number",
"fixPowerFactorQuad" : "string",
"powerRespMode" : "string",
"referencePointP1" : "number",
"referencePointP2" : "number",
"powerFactorAtP1" : "number",
"powerFactorQuadAtP1" : "string",
"powerFactorAtP2" : "number",
"powerFactorQuadAtP2" : "string",
"powerRateLimitMode" : "string",
"powerRampRate" : "number",
"reactivePowerRegulation" : "string",
"voltageSetPoint" : "number",
"voltageSetPointUnit" : "string",
"deadband" : "number",
"droop" : "number",
"baseForDroop" : "number",
"reactivePowerSourceLimit" : "number",
"reactivePowerSinkLimit" : "number",
"reactiveFixPowerFactor" : "number",
"reactiveFixPowerFactorQuad" : "string",
"generatorRampRate" : "number",
"powerRampGradient" : "number",
"frequencySensitiveMode" : "string",
"frequencyDeadband" : "number",
"frequencyDroop" : "number"
},
"devices" :
[
  {
    "deviceId" : "number",
    "nspDeviceId" : "string",
    "type" : "string",
    "subType" : "string",
    "count" : "number",

```

Item	Value
	<pre> "status" : "string", "details" : { "manufacturerName" : "string", "modelName" : "string", "nominalRatedCapacity" : "number", "nominalStorageCapacity" : "number" }, "required" : ["type"] },], "required" : ["equipmentType", "devices"] }], "exceptions" : [{ "exceptionId" : "number", "nspAcknowledged" : "string" }], "required": ["nmi", "jobNumber", "approvedCapacity", "availablePhasesCount", "installedPhasesCount", "islandableInstallation", "centralProtectionControl", "acConnections"] } } </pre>

Field Description and comments	Type	Mandated / Optional	Permitted values
nmi	string(10)	M	
Unique identifier for each connection point where DER installation has been installed/approved.			
jobNumber	string(30)	M	Specified by the NSP.
Unique identifier associated with the NSP's connection offer/agreement for the approved DER works. This number is used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.			
approvedCapacity	number(8,3)	M	0 ≤ value ≤ 30,000
Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA. Can be distinct or equal to an export limitation.			
availablePhasesCount	number(1)	M	1, 2, 3
The number of phases available for the installation of DER.			
installedPhasesCount	number(1)	M	1, 2, 3

Field	Type	Mandated / Optional	Permitted values
Description and comments			
The number of phases that DER is connected to.			
islandableInstallation	string(3)	M	Yes, No
Identifies small generating units designed with the ability to operate in an islanded mode.			
centralProtectionControl	string(3)	M	Yes, No
For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.			
Describes the type(s) of central protection to be applied to the DER system.			
exportLimitkva	number(8,3)	O	0 < value ≤ 30,000 A null value indicates no limit. See 3.9.2, page 170.
Maximum amount of power (kVA) that may be exported from a connection point to the grid, as monitored by a control / relay function.			
underFrequencyProtection	number(4,2)	O	See 3.9.2, page 170.
Under frequency protection in Hz. Described in AS4777.1:2016 Table 2.			
underFrequencyProtectionDelay	number(4,3)	O	See 3.9.2, page 170.
Under frequency protection delay in seconds.			
overFrequencyProtection	number(4,2)	O	See 3.9.2, page 170.
Over frequency protection in Hz Described in AS4777.1:2016 Table 2.			
overFrequencyProtectionDelay	number(4,3)	O	See 3.9.2, page 170.
Over frequency protection delay in seconds			
underVoltageProtection	number(9,3)	O	See 3.9.2, page 170.
Under voltage protection in volts (V)			
underVoltageProtectionDelay	number(4,3)	O	See 3.9.2, page 170.
Under voltage protection delay in seconds			
overVoltageProtection	number(9,3)	O	See 3.9.2, page 170.
Over voltage protection in volts (V)			
overVoltageProtectionDelay	number(4,3)	O	See 3.9.2, page 170.
Over voltage protection delay in seconds			
sustainedOverVoltage	number(9,3)	O	See 3.9.2, page 170.
Sustained Over voltage protection in volts (V)			
sustainedOverVoltageDelay	number(5,3)	O	10 ≤ value ≤ 20 See 3.9.2, page 170.

Field Description and comments	Type	Mandated / Optional	Permitted values
Sustained Over voltage protection delay in seconds.			
frequencyRateOfChange	number(4,3)	O	$0 \leq \text{value} \leq 4$ See 3.9.2, page 170.
Rate of change of frequency trip point (Hz/s).			
voltageVectorShift	number(4,2)	O	See 3.9.2, page 170.
Trip angle (Deg.)			
interTripScheme	string(100)	O	See 3.9.2, page 170.
Description of the form of inter-trip (e.g. "from local substation").			
neutralVoltageDisplacement	number(7,3)	O	See 3.9.2, page 170.
Trip voltage (V)			
installerId	string(50)	O	
Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'. This identifier is the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).			
submitMode	Varchar(6)	O	Save, Submit
This attribute is NOT applicable to NSPs. Any submitted value by NSP shall be rejected. It is to be used by Account-holders only.			
Comments	string(2000)	O	
Comments to help with DER Submission. NSPs can add notes for the Connection process. These comments for NSP internal use only.			
acConnections			
connectionId	number(15)	O	Null, or an existing connectionId that has been previously generated by AEMO's system.
Unique identifier for each AC Connection or Group in a DER installation. This is system-generated by AEMO. It is Null when the record is set up and before there is a connection; when the connection is set up AEMO generates a connectionId and populates the field.			
nspConnectionId	string(50)	O	
An AC Connection identifier used by NSP internally, NSPs can use this field to link their internal ID with AEMO's generated connectionId.			
commissioningDate	string (YYYY-MM-DD)	O	

Field	Type	Mandated / Optional	Permitted values
Description and comments			
<p>The date that an AC Connection becomes "Active".</p> <p>This date and AC Connection RecordConfirmedDate are needed to monitor / manage obligation on timeframe to complete submission of record. Commissioning date can be in the past, current or the future.</p>			
equipmentType	string(20)	M	Inverter, Other
Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).			
count	number(5)	O	
<p>Number of AC Connections in the group.</p> <p>For the suite of AC Connections to be considered as a group , all AC Connections included must have the same attributes.</p>			
statusCode	string(20)	O	Inactive, Active, Decommissioned
<p>Code used to indicate the status of the AC Connection. This will be used to identify if an AC Connection is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>This status is only applicable on AC Connections.</p> <p>Note: This is not a duplicate of the NMI level status, as inverters may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an AC Connection record that is created but that AC Connection is NOT physically installed or operating yet.</p> <p>Active: an AC Connection record that is physically installed and operating.</p> <p>Decommissioned: an AC Connection that used to operate, and it is NOT operating any more.</p>			
frequencyRateOfChange	number(4,3)	O	$0 \leq \text{value} \leq 4$
Rate of change of frequency (Hz/s)			
voltageVectorShift	number(4,2)	O	
Trip angle (Deg.)			
interTripScheme	string(100)	O	
Description of the form of inter-trip (e.g. "from local substation").			
neutralVoltageDisplacement	number(7,3)	O	
Trip voltage (V)			
dredInverterInteraction	string(3)	O	Yes, No
Applies if equipmentType = inverter			
serialNumbers	string(array)	O	

Field	Type	Mandated / Optional	Permitted values
<p>The serial number of the device(s)</p> <p>If the equipment type = Inverter, the number of Serial Numbers (where entered) required must match the number of AC Connections.</p> <p>For example, if "count" = 3, then "serialNumbers" (where entered) must = 3.</p> <ul style="list-style-type: none"> - For NSP APIs, "serialNumbers" can be NULL. - For Account-holder APIs, "serialNumbers" must be entered and the above rule applies or the API will return an Exception 1021. <p>The maximum number of serial numbers permissible is 999.</p>			
manufacturerName	string(120)	O	
<p>Applies if equipmentType = inverter</p> <p>The name of the inverter manufacturer</p> <p>Using DER Web, a list of accredited manufactures will be listed.</p> <p>If selected value = Other, the user needs to specify.</p>			
modelName	string(120)	O	
<p>Applies if equipmentType = inverter</p> <p>The model number of the inverter.</p> <p>Using DER Web, a list of accredited manufactures will be listed.</p> <p>If selected value = Other, the user needs to specify</p>			
inverterSeries	string(50)	O	
<p>Applies if equipmentType = inverter</p> <p>The inverter series.</p> <p>Using DER Web, a list of accredited manufactures will be listed.</p> <p>If selected value = Other, the user needs to specify.</p>			
inverterStandard	string(150)	O	
<p>Applies if equipmentType = inverter</p> <p>What standard/s is the inverter manufactured, tested and installed to?</p> <p>Using DER web, if the selected "modelName" is accredited, this value is auto-populated.</p> <p>Examples include AS4777.2:2015, IEC 62109-1 and IEC 62019-2.</p> <p>If "modelName" is equal to "Other", enter this value manually.</p> <p>The auto-populated value is obtained from reference data</p>			
inverterDeviceCapacity	number(9,3)	O	
<p>Applies if equipmentType = inverter</p> <p>The rated AC output power that is listed in the product specified by the manufacturer.</p> <p>This value refers to a single device.</p> <p>Using DER web, if the selected "modelName" is accredited , this value is auto-populated.</p> <p>If "modelName" is equal to "Other", enter this value manually.</p> <p>The auto-populated value is obtained from reference data</p>			
sustainOpOvervoltLimit	number(7,3)	O	

Field	Type	Mandated / Optional	Permitted values
<p>Applies if equipmentType = inverter</p> <p>Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the $V_{nom-max}$.</p> <p>This setting is described in AS4777.2:2015, section 7.5.2.</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>The unit is in (V)</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API, the user manually provides these details.</p>			
stopAtOverFreq	number(4,2)	O	$51 \leq \text{value} \leq 52$
<p>Applies if equipmentType = inverter</p> <p>Frequency (stop) In Hz.</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>This setting is described in AS4777.2:2015, section 7.5.3.</p>			
stopAtUnderFreq	number(4,2)	O	$47 \leq \text{value} \leq 49$
<p>Applies if equipmentType = inverter</p> <p>Frequency (stop) In Hz.</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>This mode is described in AS4777.2:2015, section 7.5.3.</p>			
invVoltWattRespMode	string(15)	O	Enabled, Not Enabled
<p>Applies if equipmentType = inverter.</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>This mode and below set points are described in AS4777.2:2015, section 6.3.2.2.</p>			
invWattRespV1	number(7,3)	O	$200 \leq \text{value} \leq 300$
<p>Applies if invVoltWattRespMode = Enabled.</p> <p>Unit is in (V)</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.2.</p>			
invWattRespV	number(7,3)	O	$216 \leq \text{value} \leq 230$
<p>Applies if invVoltWattRespMode = Enabled.</p> <p>Unit is in (V).</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.2.</p>			

Field Description and comments	Type	Mandated / Optional	Permitted values
invWattRespV3	number(7,3)	O	$235 \leq \text{value} \leq 255$
<p>Applies if invVoltWattRespMode = Enabled.</p> <p>Unit is in (V).</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.2.</p>			
invWattRespV4	number(7,3)	O	$244 \leq \text{value} \leq 265$
<p>Applies if invVoltWattRespMode = Enabled.</p> <p>Unit is in (V).</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.2.</p>			
invWattRespPAAtV1	number(6,3)	O	$0 \leq \text{value} \leq 100$
<p>Applies if invVoltWattRespMode = Enabled.</p> <p>Unit is in (%)</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.2.</p>			
invWattRespPAAtV2	number(6,3)	O	$0 \leq \text{value} \leq 100$
<p>Applies if invVoltWattRespMode = Enabled.</p> <p>Unit is in (%)</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.2.</p>			
invWattRespPAAtV3	number(6,3)	O	$0 \leq \text{value} \leq 100$
<p>Applies if invVoltWattRespMode = Enabled.</p> <p>Unit is in (%)</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.2.</p>			
invWattRespPAAtV4	number(6,3)	O	$0 \leq \text{value} \leq 20$
<p>Applies if invVoltWattRespMode = Enabled.</p> <p>Unit is in (%)</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.2.</p>			
invVoltVarRespMode	string(15)	O	Enabled, Not Enabled

Field	Type	Mandated / Optional	Permitted values
<p>Applies if equipmentType = inverter.</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>This mode and below set points are described in AS4777.2:2015, section 6.3.2.3.</p>			
invVarRespV1	number(7,3)	O	$200 \leq \text{value} \leq 300$
<p>Applies if invVoltVarRespMode = Enabled.</p> <p>Unit is in (V)</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.3.</p>			
invVarRespV2	number(7,3)	O	$200 \leq \text{value} \leq 300$
<p>Applies if invVoltVarRespMode = Enabled.</p> <p>Unit is in (V)</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.3.</p>			
invVarRespV3	number(7,3)	O	$200 \leq \text{value} \leq 300$
<p>Applies if invVoltVarRespMode = Enabled.</p> <p>Unit is in (V)</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.3.</p>			
invVarRespV4	number(7,3)	O	$200 \leq \text{value} \leq 300$
<p>Applies if invVoltVarRespMode = Enabled.</p> <p>Unit is in (V).</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.3.</p>			
invVarRespQAtV1	number(6,3)	O	$0 \leq \text{value} \leq 60$
<p>Applies if invVoltVarRespMode = Enabled.</p> <p>Unit is in (%)</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.3.</p>			
invVarRespQAtV2	number(6,3)	O	$-100 \leq \text{value} \leq 100$

Field	Type	Mandated / Optional	Permitted values
<p>Applies if invVoltVarRespMode = Enabled.</p> <p>Unit is in (%)</p> <p>-ve sign refers to "sink"</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.3.</p>			
invVarRespQAtV3	number(6,3)	O	$-100 \leq \text{value} \leq 100$
<p>Applies if invVoltVarRespMode = Enabled.</p> <p>Unit is in (%)</p> <p>-ve sign refers to "sink"</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.3.</p>			
invVarRespQAtV4	number(6,3)	O	$-60 \leq \text{value} \leq 0$
<p>Applies if invVoltVarRespMode = Enabled.</p> <p>Unit is in (%)</p> <p>-ve sign refers to "sink".</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>See AS4777.2:2015, section 6.3.2.3.</p>			
invReactivePowerMode	string(15)	O	Enabled, Not Enabled
<p>Applies if equipmentType = inverter.</p> <p>Select which power quality response modes are enabled on the inverter.</p> <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>This mode and below set points are described in AS4777.2:2015, section 6.3.3.</p>			
invFixReactivePower	number(6,3)	O	$-100 \leq \text{value} \leq 100$
<p>Applies if invReactivePowerMode = Enabled.</p> <p>Reactive Power. Specified in % output of the system.</p> <p>-ve sign refers to "sink"</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>This mode and below set points are described in AS4777.2:2015, section 6.3.3.</p>			
fixPowerFactorMode	string(15)	O	Enabled, Not Enabled

Field	Type	Mandated / Optional	Permitted values
<p>Applies if equipmentType = inverter.</p> <p>Select which power quality response modes are enabled on the inverter.</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>			
fixPowerFactor	number(4,3)	O	$0.8 \leq \text{value} \leq 1$
<p>Applies if fixPowerFactorMode = Enabled</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p>			
fixPowerFactorQuad	string(10)	O	Source, Sink
<p>Applies if fixPowerFactorMode = Enabled</p> <p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p>			
powerRespMode	string(15)	O	Enabled, Not Enabled
<p>Applies if equipmentType = inverter,</p> <p>Select which power quality response modes are enabled on the inverter.</p> <p>It should = "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p> <p>This mode and below set points are described in AS4777.2:2015, section 6.3.4.</p>			
referencePointP1	number(6,3)	O	
<p>Applies if powerRespMode = Enabled</p> <p>Unit is in (%)</p> <p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API, the user shall manually provide them.</p> <p>These settings are described in AS4777.2:2015, section 6.3.2.1.</p> <p>The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installers.</p>			
referencePointP2	number(6,3)	O	
<p>Applies if powerRespMode = Enabled</p> <p>Unit is in (%)</p> <p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API.</p> <p>If no values provided in submitPreferences API, the user shall manually provide them.</p> <p>These settings are described in AS4777.2:2015, section 6.3.2.1.</p> <p>The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installers.</p>			

Field Description and comments	Type	Mandated / Optional	Permitted values
powerFactorAtP1	number(4,3)	O	$0.9 \leq \text{value} \leq 1$
<p>Applies if powerRespMode = Enabled</p> <p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API.</p> <p>If no values provided in submitPreferences API, the user shall manually provide them.</p> <p>These settings are described in AS4777.2:2015, section 6.3.2.1.</p> <p>The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installers.</p>			
powerFactorQuadAtP1	string(10)	O	Source, Sink
<p>Applies if powerRespMode = Enabled</p> <p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API.</p> <p>If no values provided in submitPreferences API, the user shall manually provide them.</p> <p>These settings are described in AS4777.2:2015, section 6.3.2.1.</p> <p>The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installers.</p>			
powerFactorAtP2	number(4,3)	O	$0.9 \leq \text{value} \leq 1$
<p>Applies if powerRespMode = Enabled</p> <p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API.</p> <p>If no values provided in submitPreferences API, the user shall manually provide them.</p> <p>These settings are described in AS4777.2:2015, section 6.3.2.1.</p> <p>The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installers.</p>			
powerFactorQuadAtP2	string(10)	O	Source, Sink
<p>Applies if powerRespMode = Enabled</p> <p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API, the user shall manually provide them.</p> <p>These settings are described in AS4777.2:2015, section 6.3.2.1.</p> <p>The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installers.</p>			
powerRateLimitMode	string(15)	O	Enabled, Not Enabled

Field	Type	Mandated / Optional	Permitted values
<p>Applies if equipmentType = inverter</p> <p>Select which power quality response modes are enabled on the inverter.</p> <p>This mode is described in AS4777.2:2015, section 6.3.5.3.3.</p> <p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API.</p> <p>If no values provided in submitPreferences API, the user shall manually provide them.</p>			
powerRampRate	number(6,3)	O	As described in AS4777.2:2015, section 6.3.5.1.
<p>Applies if powerRateLimitMode = Enabled.</p> <p>Unit is W_{Gra}. The power rate limit range shall be adjustable in the range of 5 - 100 of rated power per minute</p> <p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API, the user shall manually provide them.</p>			
reactivePowerRegulation	string(20)	O	None, Voltage droop, Fixed power factor
Applies if equipmentType = other			
voltageSetPoint	number(9,3)	O	
<p>Applies if reactivePowerRegulation = Voltage droop.</p> <p>The voltage set point</p> <p>Units can be in either % or V</p>			
voltageSetPointUnit	string(1)	O	% V
<p>Applies if reactivePowerRegulation = Voltage droop.</p> <p>The unit for VoltageSetPoint</p>			
deadband	number(6,3)	O	
<p>Applies if reactivePowerRegulation = Voltage droop.</p> <p>± x%</p>			
Droop	number(5,3)	O	
<p>In %</p> <p>Applies if reactivePowerRegulation = Voltage droop.</p>			
baseForDroop	number(8,3)	O	
<p>Applies if reactivePowerRegulation = Voltage droop.</p> <p>In kVA</p>			
reactivePowerSourceLimit	number(8,3)	O	

Field Description and comments	Type	Mandated / Optional	Permitted values
Applies if reactivePowerRegulation = Voltage droop. kVAr			
reactivePowerSinkLimit	number(8,3)	O	
Applies if reactivePowerRegulation = Voltage droop. kVAr			
reactiveFixPowerFactor	number(4,3)	O	$0 \leq \text{value} \leq 1$
Applies if reactivePowerRegulation = Fixed power factor.			
reactiveFixPowerFactorQuad	string(10)	O	Source, Sink
Applies if reactivePowerRegulation = Fixed power factor.			
generatorRampRate	string(15)	O	Enabled, Not Enabled
Applies if equipmentType = other. A generator may have a ramp rate applied.			
powerRampGradient	number(6,3)	O	
Applies if generatorRampRate = Enabled Power ramp rate (%/min)			
frequencySensitiveMode	string(15)	O	Enabled, Not Enabled
Applies if equipmentType = other A generator may operate in a frequency sensitive mode whereby it adjusts output to help support frequency control. A generator may have a ramp rate applied.			
frequencyDeadband	number(6,3)	O	
Applies if frequencySensitiveMode = Enabled In Hz			
frequencyDroop	number(4,2)	O	
Applies if frequencySensitiveMode = Enabled In %			
devices			
deviceId	number(15)	O	Null an existing deviceId that has been previously generated by AEMO's system. This is system generated by AEMO.

Field	Type	Mandated / Optional	Permitted values
Description and comments			
<p>Unique identifier for a single DER device or a group of DER devices with the same attributes.</p> <p>AEMO's system will reject submission if deviceId is none of the above.</p> <p>Null shall be used in the event of adding a new record</p> <p>Existing deviceId will be used for updating an existing record</p>			
nspDeviceId	string(50)	O	
<p>A DER Device identifier that is used by NSP internally.</p> <p>This is provided to assist participants with linking their internal ID with AEMO's generated deviceId</p>			
type	string(50)	M	<ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other
<p>Used to indicate the primary technology used in the DER device.</p> <p>"Other" is only applicable in the DER web portal. Selecting "Other" will request the user to specify.</p> <p>Using API, it is acceptable to submit a device type that is not in the list. There is no validation applied on this.</p>			

Field Description and comments	Type	Mandated / Optional	Permitted values
subType	string(50)	O	<p>If Type = Solar PV, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Monocrystalline - Polycrystalline - Crystalline - Thin-film - Concentrating PV - Silicon - Biohybrid - Cadmium telluride - Other <p>If Type = Storage, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Lithium-ion - Lead acid - Lead carbon - Sodium nickel - Lead crystal - Absorbed glass matt - Vanadium - Aqueous hybrid ion - Tubular gel - Zinc bromide - Electric Vehicle - Other
<p>Used to indicate the primary technology used in the DER device.</p> <p>This field is also used to record for example the battery chemistry, or the type of PV panel. It is also used to record if a battery is contained in an electric vehicle connected in a vehicle-to-grid arrangement.</p> <p>"Other" is only applicable in the web portal. Selecting "Other" will request the user to specify.</p> <p>- Using API, it is acceptable to submit a device sub-type that is not in the list. There is no validation applied on this.</p>			
count	number(5)	O	
number of devices in the group of DER devices.			
status	string(20)	O	Inactive, Active, Decommissioned

Field Description and comments	Type	Mandated / Optional	Permitted values
<p>Code used to indicate the status of the DER Device. This will be used to identify if a Device is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>This status is only applicable on DER Device. This is not a duplicate of the NMI level status, as Devices may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an DER Device record that is created but that DER Device is NOT physically installed or operating yet.</p> <p>Active: an DER Device record that is physically installed and operating</p> <p>Decommissioned: an DER Device that used to operate, and it is NOT operating any more.</p>			
manufacturerName	string(120)	O	
<p>The name of the device manufacturer</p> <p>Using DER Web, a list of accredited manufactures will be listed.</p> <p>If selected value = Other, the user needs to specify</p>			
modelName	string(120)	O	
<p>The model number of the device.</p> <p>Using DER Web, a list of accredited model numbers will be listed.</p> <p>If selected value = Other, the user needs to specify</p>			
nominalRatedCapacity	number(8,3)	O	
<p>Maximum output in kVA that is listed in the product specification by the manufacturer. This refers to the capacity of each unit within the device group.</p> <p>Using DER web, if the selected "modelName" is accredited , this value will be auto-populated.</p> <p>If "modelName" is equal to "Other", enter this value manually.</p> <p>The auto-populated value is obtained from reference data</p>			
nominalStorageCapacity	number(9,3)	O	
<p>Applies if type = Storage</p> <p>Maximum storage capacity in kWh. This refers to the capacity of each storage module within the device group.</p> <p>Using DER web, if the selected "modelName" is accredited , this value will be auto-populated.</p> <p>If "modelName" is equal to "Other", enter this value manually.</p> <p>The auto-populated value is obtained from reference data</p>			
exceptions			
exceptionId	number	O	Null an existing exceptionId that was previously generated by AEMO

Field	Type	Mandated / Optional	Permitted values
Description and comments			
<p>A unique identification for an exception generated when business validation fails</p> <p>This value is integer and System generated.</p> <p>This Id will be generated by AEMO upon a submission that fails business validation</p> <p>If the exceptionId was not generated by AEMO, the system will reject the submission.</p>			
nspAcknowledged	string(3)	O	- Yes - No
<p>Applies if "exceptionId" is provided.</p> <p>This is used when there is an exception but the user acknowledges it without resolving/editing the exception.</p> <p>For example, if model number is not accredited, AEMO will generate an exception. The user will have the ability to acknowledge it and exception will be closed.</p> <p>Yes indicates that the user acknowledged the exception and AC Connection or Device will become "Confirmed" (provided no other exceptions).</p> <p>No will do nothing to the exception, and it will stay open.</p>			

3.2.3 Valid Submission Response

Item	Value
Response Code	200
Header	<p>Standard response header attributes:</p> <p>Content-Type: application/json</p> <p>Content-Encoding: As requested [gzip, compress, deflate]</p> <p>Accept-Encoding: As requested [gzip, compress, deflate]</p>
Body	<pre>{ "transactionId" : "string", "data" : { "nmi" : "string", "jobNumber" : "string", "recordUpdateDate" : "string", "approvedCapacity": "number", "availablePhasesCount" : "number", "installedPhasesCount": "number", "islandableInstallation" : "string", "centralProtectionControl" : "string", "exportLimitkva" : "number", "underFrequencyProtection" : "number", "underFrequencyProtectionDelay" : "number", "overFrequencyProtection" : "number", "overFrequencyProtectionDelay" : "number", "underVoltageProtection" : "number", "underVoltageProtectionDelay" : "number", "overVoltageProtection" : "number", } }</pre>

Item	Value
	<pre> "overVoltageProtectionDelay" : "number", "sustainedOverVoltage" : "number", "sustainedOverVoltageDelay" : "number", "frequencyRateOfChange" : "number", "voltageVectorShift" : "number", "interTripScheme" : "string", "neutralVoltageDisplacement" : "number", "installerId" : "string", "submitterId" : "string", "submitterClass" : "string", "submitMode" : "string", "comments" : "string", "acConnections": [{ "connectionId" : "number", "nspConnectionId" : "string", "recordCreationDate" : "string", "recordConfirmedDate" : "string", "recordEndDate" : "string", "commissioningDate" : "string", "installationStage" : "string", "equipmentType" : "string", "cecConnectionId" : "string", "count" : "number", "statusCode" : "string", "frequencyRateOfChange" : "number", "voltageVectorShift" : "number", "interTripScheme" : "string", "neutralVoltageDisplacement" : "number", "details" : { "dredInverterInteraction" : "string", "serialNumbers" : ["string"], "manufacturerOther" : "boolean", "manufacturerName" : "string", "modelOther" : "boolean", "modelName" : "string", "inverterSeriesOther" : "boolean", "inverterSeries" : "string", "inverterStandard" : "string", "inverterDeviceCapacity" : "number", "sustainOpOvervoltLimit" : "number", "stopAtOverFreq" : "number", "stopAtUnderFreq" : "number", "invVoltWattRespMode" : "string", "invWattRespV1" : "number", "invWattRespV2" : "number", "invWattRespV3" : "number", "invWattRespV4" : "number", "invWattRespPATV1" : "number", "invWattRespPATV2" : "number", </pre>

Item	Value
	<pre> "invWattRespPAtV3" : "number", "invWattRespPAtV4" : "number", "invVoltVarRespMode" : "string", "invVarRespV1" : "number", "invVarRespV2" : "number", "invVarRespV3" : "number", "invVarRespV4" : "number", "invVarRespQAtV1" : "number", "invVarRespQAtV2" : "number", "invVarRespQAtV3" : "number", "invVarRespQAtV4" : "number", "invReactivePowerMode" : "string", "invFixReactivePower" : "number", "fixPowerFactorMode" : "string", "fixPowerFactor" : "number", "fixPowerFactorQuad" : "string", "powerRespMode" : "string", "referencePointP1" : "number", "referencePointP2" : "number", "powerFactorAtP1" : "number", "powerFactorQuadAtP1" : "string", "powerFactorAtP2" : "number", "powerFactorQuadAtP2" : "string", "powerRateLimitMode" : "string", "powerRampRate" : "number", "reactivePowerRegulation" : "string", "voltageSetPoint" : "number", "voltageSetPointUnit" : "string", "deadband" : "number", "droop" : "number", "baseForDroop" : "number", "reactivePowerSourceLimit" : "number", "reactivePowerSinkLimit" : "number", "reactiveFixPowerFactor" : "number", "reactiveFixPowerFactorQuad" : "string", "generatorRampRate" : "number", "powerRampGradient" : "number", "frequencySensitiveMode" : "string", "frequencyDeadband" : "number", "frequencyDroop" : "number" }, "devices" : [{ "deviceId" : "number", "nspDeviceId" : "string", "recordCreationDate" : "string", "recordCommissioningDate" : "string", "recordConfirmedDate" : "string", "recordEndDate" : "string", "cecDeviceId" : "string", "type" : "string", </pre>

Item	Value
	<pre> "subType" : "string", "count" : "number", "status" : "string", "installationStage" : "string", "details" : { "typeOther" : "boolean", "subTypeOther" : "boolean", "manufacturerOther" : "boolean", "manufacturerName" : "string", "modelOther" : "boolean", "modelName" : "string", "nominalRatedCapacity" : "number", "nominalStorageCapacity" : "number" }] }], "exceptions" : [{ "exceptionId" : "number", "code" : "number", "name" : "string", "affectedAttributes" : ["string"], "details" : "string", "status" : "string", "deviceId" : "number", "connectionId" : "number", "nspAcknowledged" : "string" }], "receipt" : { "nmi" : "string", "jobNumber" : "string", "disclaimer" : "string", "derJobCompleteDate" : "string", "installerId" : "string", "approvedCapacity" : "number", "confirmationLengthTime" : "number", "centralProtectionControl" : "string", "acConnections" : [{ "connectionId" : "number", "equipmentType" : "string", "installedCapacity" : "number", "manufacturerName" : "string", "modelName" : "string" }] } </pre>

Item	Value
	<pre>], "devices" : [{ "deviceId" : "number", "type" : "string", "installedCapacity": "number", "manufacturerName" : "string", "modelName" : "string" }] }</pre>

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
nmi	N/A	string(10)	Unique identifier for each connection point where DER installation has been installed/approved	
jobNumber	N/A	string(30)	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works	This identifier is specified by the NSP as per their connection process. This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
recordUpdateDate	N/A	string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Record was updated.	AEMO will store a history of all versions changes and it can be tracked via this date. A new version is generated every time a new submission or update happens
approvedCapacity	N/A	number(8,3)	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Can be distinct or equal to an export limitation. Permitted range is between 0 and 30,000
availablePhasesCount	N/A	number(1)	The number of phases available for the installation of DER.	Permitted value is one of the following: <ul style="list-style-type: none"> • 1 • 2 • 3
installedPhasesCount	N/A	number(1)	The number of phases that DER is connected to.	Permitted value is one of the following: <ul style="list-style-type: none"> • 1 • 2 • 3

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
islandableInstallation	N/A	string(3)	For identification of small generating units designed with the ability to operate in an islanded mode.	Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
centralProtectionControl	See 3.9.2, page 170.	string(3)	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Used to describe the type(s) of central protection to be applied to the DER system. Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
exportLimitkva	See 3.9.2, page 170.	number(8,3)	Export limit (kVA) Maximum amount of power (kVA) that may be exported from a connection point to the grid, as monitored by a control / relay function. A null value indicates no limit.	Permitted range is between 0 and 30,000
underFrequencyProtection	See 3.9.2, page 170.	number(4,2)	Under frequency protection in Hz	Described in AS4777.1:2016 Table 2. Permitted range is between 45 and 50 (inclusive)
underFrequencyProtectionDelay	See 3.9.2, page 170.	number(4,3)	Under frequency protection delay in seconds	
overFrequencyProtection	See 3.9.2, page 170.	number(4,2)	Over frequency protection in Hz	Described in AS4777.1:2016 Table 2. Permitted range is between 50 and 55 (inclusive)

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
overFrequencyProtectionDelay	See 3.9.2, page 170.	Number(4,3)	Over frequency protection delay in seconds	
underVoltageProtection	See 3.9.2, page 170.	number(9,3)	Under voltage protection in volts (V)	Described in AS4777.1:2016 Table 2.
underVoltageProtectionDelay	See 3.9.2, page 170.	number(4,3)	Under voltage protection delay in seconds	
overVoltageProtection	See 3.9.2, page 170.	number(9,3)	Over voltage protection in volts (V)	Described in AS4777.1:2016 Table 2.
overVoltageProtectionDelay	See 3.9.2, page 170.	number(4,3)	Over voltage protection delay in seconds	
sustainedOverVoltage	See 3.9.2, page 170.	number(9,3)	Sustained over voltage protection in volts (V)	Described in AS4777.1:2016 Table 2.
sustainedOverVoltageDelay	See 3.9.2, page 170.	number(5,3)	Sustained over voltage protection delay in seconds.	Permitted range is between 10 and 20 (inclusive).
frequencyRateOfChange	See 3.9.2, page 170.	number(4,3)	Rate of change of frequency trip point (Hz/s).	Permitted range is between 0 and 4 (inclusive)
voltageVectorShift	See 3.9.2, page 170.	number(4,2)	Trip angle (Deg)	
interTripScheme	See 3.9.2, page 170.	string(100)	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement	See 3.9.2, page 170.	number(7,3)	Trip voltage (V)	

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
installerId		string(50)	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).
submitterId		string(50)	Records the user id that submitted this record	This is system generated by AEMO.
submitterClass		string(9)	Records the user classification whether it is NSP or others	Would be either "NSP" or "Installer"
submitMode		Varchar(6)		This attribute is NOT applicable to NSPs. It is to be used by Account-holders. Any submitted value by NSP shall be rejected Permitted values is one of the following: Save Submit
comments		string(2000)	Comments to help with DER Submission.	This field shall help NSPs to write notes that help with the "Connection Process". These comments for NSP internal use only.
acConnections				
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	This is system generated by AEMO.
nspConnectionId		string(50)	An AC Connection identifier that is used by NSP internally	This is provided to assist participants with linking their internal ID with AEMO's generated connectionId

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
recordCreationDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when AC Connection record was created.	System generated and it is the date that the AC Connection gets submitted for the first time
recordConfirmedDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when AC Connection record becomes "Confirmed" for the first time	System generated. This date in combination with AC Connection commissioning date are needed to monitor / manage obligation on timeframe to complete submission of record.
recordEndDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when AC Connection record ends or becomes decommissioned	System generated If DER Record is "Initial" or "Idle" and it is removed, this date will capture the removal date. If DER Record is "Conditional" or "Confirmed" and it is decommissioned, this date will capture the decommissioning date.
commissioningDate		string (YYYY-MM-DD)	The date that an AC Connection becomes "Active"	This date and AC Connection RecordConfirmedDate are needed to monitor / manage obligation on timeframe to complete submission of AC Connection. Commissioning date can be in the past, present or the future
installationStage		string(11)	Installation stage of the AC connection. This will be used to indicate to the user whether the AC Connection is initial, conditional, confirmed, or idle. See 2.8, Installation stage.	Permitted value to be returned is one of the following: - Initial - Conditional - Confirmed - Idle

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
equipmentType		string(20)	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted value is one of the following: - Inverter - Other
cecConnectionId		string(30)	Unique device identifier to store CEC inverter reference data	This ID shall be returned if the submitted inverter is accredited
count		number(5)	Number of AC Connections in the group. For the suite of AC Connections to be considered as a group , all the AC Connections included must have the same attributes.	

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
statusCode		string(20)	<p>Code used to indicate the status of the AC Connection. This will be used to identify if an AC Connection is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> - Inactive - Active - Decommissioned 	<p>This status is only applicable on AC Connections. This is not a duplicate of the NMI level status, as inverters may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an AC Connection record that is created but that AC Connection is NOT physically installed or operating yet.</p> <p>Active: an AC Connection record that is physically installed and operating</p> <p>Decommissioned: an AC Connection that used to operate, and it is NOT operating any more.</p>
frequencyRateOfChange		number(4,3)	<p>Rate of change of frequency (Hz/s)</p> <p>Permitted value is between 0 and 4 (inclusive)</p>	
voltageVectorShift		number(4,2)	Trip angle (Deg.)	
interTripScheme		string(100)	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement		number(7,3)	Trip voltage (V)	

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
dredInverterInteraction	If equipmentType = inverter	string(3)		Permitted value is one of the following: - Yes - No
serialNumbers		string(array)	The serial number of the device(s)	If the equipment type = Inverter, the number of Serial Numbers (where entered) required must match the number of AC Connections. For example, if "count" = 3, then "serialNumbers" (where entered) must = 3. - For NSP APIs, "serialNumbers" can be NULL. - For Account-holder APIs, "serialNumbers" must be entered and the above rule applies or the API will return an Exception 1021. The maximum number of serial numbers permissible is 999.
manufacturerOther		boolean	This is used to indicate if a manufacturer is accredited	Permitted value is one of the following: • true • false
manufacturerName	If equipmentType = inverter	string(120)	The name of the inverter manufacturer	Using DER Web, a list of accredited manufactures will be listed. If selected value = Other, the user needs to specify
modelOther		boolean	This is used to indicate if a model number is accredited	Permitted value is one of the following: • true • false
modelName		string(120)	The model number of the inverter.	Using DER Web, a list of accredited model numbers will be listed. If selected value = Other, the user needs to specify

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
inverterSeriesOther		boolean	This is used to indicate if an inverter series is accredited	Permitted value is one of the following: <ul style="list-style-type: none"> • true • false
inverterSeries		string(50)	The inverter series.	Using DER Web, a list of accredited model numbers will be listed. If selected value = Other, the user needs to specify
inverterStandard		string(100)	What standard/s is the inverter manufactured, tested and installed to? Examples include AS4777.2:2015, IEC 62109-1 and IEC 62019-2.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other", enter this value manually. The auto-populated value is obtained from reference data
inverterDeviceCapacity		number(9,3)	The rated AC output power that is listed in the product specified by the manufacturer. This value refers to a single device.	Using DER web, if the selected "modelName" is accredited, this value will be auto-populated. If "modelName" is equal to "Other", enter this value manually. The auto-populated value is obtained from reference data
sustainOpOvervoltLimit		number(7,3)	Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the $V_{nom-max}$. The unit is in (V)	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values provided in submitPreferences API, the user shall manually provide them
stopAtOverFreq		number(4,2)	Frequency (stop). In Hz Permitted range is between 51 and 52 (inclusive)	

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
stopAtUnderFreq		number(4,2)	Frequency (stop). In Hz Permitted range is between 47 and 49 (inclusive)	
invVoltWattRespMode	If equipmentType = inverter	string(15)	Permitted Value is one of the following: - Enabled - Not Enabled	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API
invWattRespV1	If invVoltWattRespMode = Enabled	number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them This mode is described in AS4777.2:2015, section 6.3.2.1.
invWattRespV2		number(7,3)	Unit is in (V). Permitted range is between 216 and 230 (inclusive)	
invWattRespV3		number(7,3)	Permitted range is between 235 and 255 (inclusive)	
invWattRespV4		number(7,3)	Unit is in (V). Permitted range is between 244 and 265 (inclusive)	
invWattRespPAV1		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
invWattRespPAAtV2		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAAtV3		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAAtV4		number(6,3)	Unit is in (%) Permitted range is between 0 and 20 (inclusive)	
invVoltVarRespMode	If equipmentType = inverter	string(15)	Permitted Value is one of the following: - Enabled - Not Enabled	
invVarRespV1	If invVoltVarRespMode = Enabled	number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespV2		number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespV3		number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
invVarRespV4		number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespQAtV1		number(6,3)	Unit is in (%) Permitted range is between 0 and 60 (inclusive)	
invVarRespQAtV2		number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	
invVarRespQAtV3		number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	
invVarRespQAtV4		number(6,3)	Unit is in (%) Permitted range is between -60 and 0 (inclusive) -ve sign refers to "sink".	

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
invReactivePowerMode	If equipmentType = inverter	string(15)	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> - Enabled - Not Enabled <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	<p>Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API.</p> <p>If no values provided in submitPreferences API, the user shall manually provide them</p>
invFixReactivePower	If invReactivePowerMode = Enabled	number(6,3)	<p>Reactive Power. Specified in % output of the system.</p> <p>Permitted range is between -100 and 100 (inclusive).</p> <p>-ve sign refers to "sink"</p>	
fixPowerFactorMode	If equipmentType = inverter	string(15)	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> - Enabled - Not Enabled <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
fixPowerFactor	If fixPowerFactor Mode = Enabled	number(4,3)	Permitted range is between 0.8 and 1 (inclusive)	
fixPowerFactorQuad		string(10)	Permitted Value is one of the following: - Source - Sink	
powerRespMode	If equipmentType = inverter	string(15)	Select which power quality response modes are enabled on the inverter. Permitted Value is one of the following: - Enabled - Not Enabled It should = "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.	
referencePointP1	If powerRespMode = Enabled	number(6,3)	Unit is in (%)	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values provided in submitPreferences API, the user shall manually provide them The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installation.
referencePointP2		number(6,3)	Unit is in (%)	
powerFactorAtP1		number(4,3)	Permitted range is between 0.9 and 1 (inclusive)	
powerFactorQuadAtP1		string(10)	Permitted Value is one of the following: Source Sink	

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
powerFactorAtP2		number(4,3)	Permitted range is between 0.9 and 1 (inclusive)	
powerFactorQuadAtP2		string(10)	Permitted Value is one of the following: <ul style="list-style-type: none"> • Source • Sink 	
powerRateLimitMode	If equipmentType = inverter	string(15)	Select which power quality response modes are enabled on the inverter.	<p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API , the user shall manually provide them</p> <p>This mode is described in AS4777.2:2015, section 6.3.5.3.3.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled
powerRampRate	If powerRateLimitMode = Enabled	number(6,3)	Unit is W_{Gra} , The power rate limit range shall be adjustable in the range of 5 - 100 of rated power per minute	<p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API , the user shall manually provide them</p> <p>As described in AS4777.2:2015, section 6.3.5.1.</p>

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
reactivePowerRegulation	If equipmentType = inverter	string(20)		Permitted Value is one of the following: <ul style="list-style-type: none"> • None • Voltage droop • Fixed power factor
voltageSetPoint	If reactivePowerRegulation = Voltage droop	number(9,3)	The set voltage point	
voltageSetPointUnit		string(1)	The unit for voltageSetPoint	Permitted Value is one of the following: <ul style="list-style-type: none"> • % • V
deadband		number(6,3)	± x%	
droop		number(5,3)	In %	
baseForDroop		number(8,3)	In kVA	
reactivePowerSourceLimit		number(8,3)	In Var	
reactivePowerSinkLimit	If reactivePowerRegulation = Fixed power factor	number(8,3)	In Var	
reactiveFixPowerFactor		number(4,3)		Permitted range is between 0 and 1 (inclusive)
reactiveFixPowerFactorQuadrant		string(10)		Permitted Value is one of the following: <ul style="list-style-type: none"> • Source • Sink

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
generatorRampRate	If equipmentType = inverter	string(15)		A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled
powerRampGradient	If generatorRampRate = Enabled	number(6,3)	Power ramp rate (%/min)	Permitted range is between 0 and 100 (inclusive)
frequencySensitiveMode	If equipmentType = inverter	string(15)		A generator may operate in a frequency sensitive mode whereby it adjusts output to help support frequency control. A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled
frequencyDeadband	If frequencySensitiveMode = Enabled	number(6,3)	In Hz	
frequencyDroop		number(4,2)	In %	

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
devices				
deviceId		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO.</p> <p>Permitted value is either:</p> <ul style="list-style-type: none"> - Null; or - an existing deviceId that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceId is none of the above.</p> <p>Null shall be used in the event of adding a new record</p> <p>Existing deviceId will be used for updating an existing record</p>
nspDeviceId		string(50)	A DER Device identifier that is used by NSP internally	This is provided to assist participants with linking their internal ID with AEMO's generated deviceId
recordCreationDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record was created.	
recordCommissioningDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record became active.	<p>This will either equal to:</p> <p>Commissioning date of the AC Connection linked to it, if they were created on the same date; OTHERWISE</p> <p>The date that the DER Device status becomes "Active"</p> <p>recordCommissioningDate can be in the past, or present</p>

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
recordConfirmedDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record became "Confirmed" for the first time	System generated. This date in combination with Device recordCommissioningDate are needed to monitor / manage obligation on timeframe to complete submission of record.
recordEndDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record ends/decommissioned	System generated If DER Record is "Initial" or "Idle" and it is removed, this date will capture the removal date. If DER Record is "Conditional" or "Confirmed" and it is decommissioned, this date will capture the decommissioning date.
cecDeviceId		string(30)	Unique device identifier to store CEC Device reference data	This ID shall be returned if the submitted device is accredited
type		string(50)	Used to indicate the primary technology used in the DER device.	Expected Value is one of the following: <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other "Other" is only applicable in the web portal. Selecting "Other" will request the user to specify. Using API, it is accepted to submit a device type that is not in the list. There is no validation applied on this.

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

subType	string(50)	Used to indicate the primary technology used in the DER device.	<p>This field is also used to record for example the battery chemistry, or the type of PV panel. It is also used to record if a battery is contained in an electric vehicle connected in a vehicle-to-grid arrangement.</p> <p>If Type = Solar PV, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Monocrystalline - Polycrystalline - Crystalline - Thin-film - Concentrating PV - Silicon - Biohybrid - Cadmium telluride - Other <p>If Type = Storage, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Lithium-ion - Lead acid - Lead carbon - Sodium nickel - Lead crystal - Absorbed glass matt - Vanadium - Aqueous hybrid ion - Tubular gel - Zinc bromide - Electric Vehicle - Other <p>If Type != Solar PV or Storage, the permitted value is "Other" "Other" is only applicable in the web portal. Selecting "Other" will request the user to specify</p>
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3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
				Using API, it is accepted to submit a device sub-type that is not in the list. There is no validation applied on this.
count		number(5)	Number of devices in the group of DER devices.	
status		string(20)	<p>Code used to indicate the status of the DER Device. This will be used to identify if a Device is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p>	<p>This status is only applicable on DER Device. This is not a duplicate of the NMI level status, as Devices may become active or inactive without a change of status to the overall system.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> - Inactive - Active - Decommissioned <p>Inactive: a DER Device record that is created but that DER Device is NOT physically installed or operating yet.</p> <p>Active: a DER Device record that is physically installed and operating</p> <p>Decommissioned: a DER Device that used to operate, and it is NOT operating any more.</p>
installationStage		string(11)	<p>Installation stage of the DER Device.</p> <p>This will be used to indicate to the user if the DER Device is initial, conditional, confirmed, or idle.</p> <p>See 2.8, Installation stage.</p>	<p>Permitted value to be returned is one of the following:</p> <ul style="list-style-type: none"> - Initial - Conditional - Confirmed - Idle

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
typeOther	If type = Other	boolean	To indicate if the submitted device type is part of the provided list.	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> - true - false <p>If the submitted device "type" is one of the list provided below, the returned value is false</p> <p>If the submitted device "type" is NOT one of the list provided below, the returned value shall be false</p>
subTypeOther	If subType = Other	boolean	To indicate if the submitted device subtype is part of the provided list	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • true • false <p>If the submitted device "subType" is one of the list provided below, the returned value shall be false</p> <p>If the submitted device "subType" is NOT one of the list provided below, the returned value shall be true</p>
manufacturerOther		boolean	This is used to indicate if a manufacturer is accredited	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • true • false
manufacturerName		string(120)	The name of the device manufacturer	Definitions align to the approved modules list.
modelOther		boolean	This is used to indicate if a model number is accredited	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • true • false
modelName		string(120)	The model number of the device.	Definitions align to the approved modules list.

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
nominalRatedCapacity		number(8,3)	Maximum output in kVA that is listed in the product specification by the manufacturer. This refers to the capacity of each unit within the device group.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually The auto-populated value is obtained from reference data
nominalStorageCapacity	If Type = Storage	number(9,3)	Maximum storage capacity in kWh. This refers to the capacity of each storage module within the device group.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually The auto-populated value is obtained from reference data
exceptions				
exceptionId		number	A unique identification for an exception generated when business validation fails	This Id is integer value and will be generated by AEMO upon a submission that fails business validation Permitted value of submission is one of the following: an existing exceptionId that was previously generated by AEMO Null If the ExceptionId was not generated by AEMO, the system will reject the submission.
code		number(4)	Code used to indicate the type of exception	
name		string(20)	Name of exception	
AffectedAttributes		string(300)	Lists the names of fields that were the reason for producing this exception	

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
details		string(200)	Description of the exception	
status		string(6)	Status of exception (Open or closed)	Permitted values is one of the following: <ul style="list-style-type: none"> • Open • Closed
deviceld		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO.</p> <p>Permitted value is either:</p> <ul style="list-style-type: none"> • Null; or • an existing deviceld that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceld is none of the above.</p> <p>Null shall be used in the event of adding a new record</p> <p>Existing deviceld will be used for updating an existing record</p>
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	<p>This is system generated by AEMO.</p> <p>Permitted value is either:</p> <ul style="list-style-type: none"> - Null; or - an existing connectionId that has been previously generated by AEMO <p>AEMO's system will reject submission if connectionId is none of the above.</p> <p>Null shall be used in the event of adding a new record</p> <p>Existing connectionId will be used for updating an existing record</p>

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
nspAcknowledged		string(3)	This is used when there is an exception but the user acknowledges it without resolving/editing the exception. For example, if model number is not accredited, AEMO will generate an exception. The user will have the ability to acknowledge it and exception will be closed	Permitted value is one of the following: - Yes - No Yes indicates that the user acknowledged the exception and record will become "Confirmed" (provided no other exceptions) No will do nothing to the exception and it will stay open.
receipt				
nmi		string(10)	Unique identifier for each connection point where DER installation has been installed/approved	
jobNumber		string(30)	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	This identifier is specified by the NSP as per their connection process. This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
disclaimer		string	Standard disclaimer information provided to Account-holders after submitting DER record details.	Only returned to Account-holders. For NSPs, this is returned as null.
derJobCompleteDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when all AC Connections and DER Devices for a certain job become "Confirmed". It is the date that receipt is generated	System generated.

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
installerId		string(50)	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).
approvedCapacity		number(8,3)	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Can be distinct or equal to an export limitation. Permitted range is between 0 and 30,000
confirmationLengthTime		number(6,3)	The time of how long it took a job to be complete since records were active	The number of business days between derJobCompleteDate and the last commissioningDate/recordCommissioningDate for a DER Record during a certain job
centralProtectionControl		string(3)	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Used to describe the type(s) of central protection to be applied to the DER system. Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
receipt acConnections				
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	This is system generated by AEMO.

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
equipmentType		string(20)	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted value is one of the following: <ul style="list-style-type: none"> • Inverter • Other
installedCapacity	If EquipmentType = Inverter	number(8,3)	The total capacity of inverter that are installed during a certain job	It is a calculated value. It represents what is the total inverter capacity that is physically installed at site for a certain job number
manufacturerName		string(120)		Only returned to account-holders. For NSPs, this is returned as null.
modelName		string(120)		Only returned to account-holders. For NSPs, this is returned as null.
receipt devices				
deviceId		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	This is system generated by AEMO.

3. NSP APIs, 3.2 POST submitDER 3.2.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
type		string(50)	Used to indicate the primary technology used in the DER device.	<p>Expected Value is one of the following:</p> <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other <p>Other values might be returned depends on the submitted Device "type".</p>
installedCapacity		number(8,3)	The total capacity of DER Devices installed during a job	It is a calculated value. It represents what is the total device capacity that is physically installed at site for a certain job number
manufacturerName		string(120)		<p>Only returned to account-holders.</p> <p>For NSPs, this is returned as null.</p>
modelName		string(120)		<p>Only returned to account-holders.</p> <p>For NSPs, this is returned as null.</p>

Invalid Submission Response

Item	Value
Response Code	422
Header	Standard response header attributes: Content-Type: application/json Content-Encoding: As requested [gzip, compress, deflate]
Body	<pre>{ "transactionId" : "string", "errors" : [{ "code": "string", "title": "string", "detail": "string", "source": "string" }] }</pre>

3.3 POST submitPreferences

3.3.1 Description

This API is used by participants to submit preferences for contact details, inverter settings, and notifications based on approved capacity.

3.3.2 Request

Item	Value
URL Path	/submitPreferences
Method	POST
Header	Standard request header attributes, be sure to include: Authorization: Basic Content-Encoding: Should be one of [gzip, deflate, compress] Accept-Encoding: Should be one or more of [gzip, deflate, compress]
Body	<pre>{ "data" : { "contactRole" : "string", "emailAddress" : "string",</pre>

Item	Value
	<pre> "phoneNumber" : "string", "notifications" : [{ "minApprovedCapacity" : "number", "maxApprovedCapacity" : "number", "approvalRequired" : "Boolean", "required" : ["minApprovedCapacity", "maxApprovedCapacity", "approvalRequired"] }], "inverterSettings" : [{ "minimumCapacity" : "number", "maximumCapacity" : "number", "details" : { "sustainOpOvervoltLimit" : "number", "stopAtOverFrequency" : "number", "stopAtUnderFrequency" : "number", "inverterVoltWattResponseMode" : "string", "inverterWattResponseV1" : "number", "inverterWattResponseV2" : "number", "inverterWattResponseV3" : "number", "inverterWattResponseV4" : "number", "inverterWattResponsePatV1" : "number", "inverterWattResponsePatV2" : "number", "inverterWattResponsePatV3" : "number", "inverterWattResponsePatV4" : "number", "inverterVoltVarResponseMode" : "string", "inverterVarResponseV1" : "number", "inverterVarResponseV2" : "number", "inverterVarResponseV3" : "number", "inverterVarResponseV4" : "number", "inverterVarResponseQatV1" : "number", "inverterVarResponseQatV2" : "number", "inverterVarResponseQatV3" : "number", "inverterVarResponseQatV4" : "number", "inverterReactivePowerMode" : "string", "inverterFixedReactivePower" : "number", "fixedPowerFactorMode" : "string", "fixedPowerFactor" : "number", "fixedPowerFactorQuadrant" : "string", "powerResponseMode" : "string", "referencePointP1" : "number", "referencePointP2" : "number", "powerFactorAtP1" : "number", "powerFactorQuadrantAtP1" : "string", "powerFactorAtP2" : "number", "powerFactorQuadrantAtP2" : "string", "powerRateLimitMode" : "string", "powerRampRate" : "number" } }] </pre>

Item	Value
	<pre> }, "required" : ["minimumCapacity", "maximumCapacity"] }], "required": ["emailAddress"] } }</pre>

Field	Type	Option	Description	Comments
contactRole	string(10)	O	Role of NSP individual in charge of the connection process.	These fields are displayed for Account-holders and are used to contact NSPs when there is a query about connection process.
emailAddress	string(50)	M	NSP contact email address	
phoneNumber	string(15)	O	NSP contact phone number	
Notifications				
minApprovedCapacity	number(8,3)	M	Minimum approved capacity in kVA.	Permitted range is between 0 and 30,000 User shall be able to provide a range of values with the preferred settings. Ranges should not overlap.
maxApprovedCapacity	number(8,3)	M	Maximum approved capacity in kVA	Permitted range is between 0 and 30,000 User shall be able to provide a range of values with the preferred settings. Ranges should not overlap.

Field	Type	Option	Description	Comments
approvalRequired	string(3)	M	Indicates if an NSP must approve a submission done by Account-holders.	<p>Permitted value is either Yes or No.</p> <p>If approvalRequired = Yes, AC Connections and DER Devices within the specified range shall be "Conditional" until NSPs approve them</p> <p>If approvalRequired = No, AC Connections and DER Devices within the specified range shall be "Confirmed" if they passed validations</p> <p>If ranges are not provided, the default value shall be "No", i.e. submissions by installers shall not require NSP's approval</p>
Inverter Settings				
minimumCapacity	number(8,3)	M	Minimum inverter capacity in kVA	User can provide a range of values with the preferred inverter settings.
maximumCapacity	number(8,3)	M	Maximum inverter capacity in kVA	<p>Ranges should not overlap</p> <p>When you provide inverter settings, these values are auto populated.</p>
sustainOpOvervoltageLimit	number(7,3)	O	Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the $V_{nom-max}$, in (V)	<p>Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range</p> <p>Auto-populated values are based on the submitted data in submitPreferences API</p> <p>If no values provided in submitPreferences API, the user shall manually provide them.</p>
stopAtOverFreq	number(4,2)	O	Frequency (stop) In Hz	Permitted range is between 51 and 52 (inclusive)
stopAtUnderFreq	number(4,2)	O	Frequency (stop) In Hz	Permitted range is between 47 and 49 (inclusive)

Field	Type	Option	Description	Comments
invVoltWattResp Mode	string(15)	O	This mode is described in AS4777.2:2015, section 6.3.2.1.	Permitted values are Enabled, or Not Enabled.
invWattRespV1	number(7,3)	O	Unit is in (V)	Permitted range is between 200 and 300 (inclusive)
invWattRespV2	number(7,3)	O	Unit is in (V)	Permitted range is between 216 and 230 (inclusive)
invWattRespV3	number(7,3)	O	Unit is in (V)	Permitted range is between 235 and 255 (inclusive)
invWattRespV4	number(7,3)	O	Unit is in (V)	Permitted range is between 244 and 265 (inclusive)
invWattRespPA1 V1	number(6,3)	O	Unit is in (%)	Permitted range is between 0 and 100 (inclusive)
invWattRespPA1 V2	number(6,3)	O	Unit is in (%)	Permitted range is between 0 and 100 (inclusive)
invWattRespPA1 V3	number(6,3)	O	Unit is in (%)	Permitted range is between 0 and 100 (inclusive)
invWattRespPA1 V4	number(6,3)	O	Unit is in (%)	Permitted range is between 0 and 20 (inclusive)
invVoltVarResp Mode	string(15)	O		Permitted values are Enabled, or Not Enabled
invVarRespV1	number(7,3)	O	Unit is in (V)	Permitted range is between 200 and 300 (inclusive)
invVarRespV2	number(7,3)	O	Unit is in (V)	Permitted range is between 200 and 300 (inclusive)
invVarRespV3	number(7,3)	O	Unit is in (V)	Permitted range is between 200 and 300 (inclusive)
invVarRespV4	number(7,3)	O	Unit is in (V)	Permitted range is between 200 and 300 (inclusive)
invVarRespQA1 V1	number(6,3)	O	Unit is in (%)	Permitted range is between 0 and 60 (inclusive)
invVarRespQA1 V2	number(6,3)	O	Unit is in (%) Note: -ve sign refers to "sink".	Permitted range is between -100 and 100 (inclusive)

Field	Type	Option	Description	Comments
invVarRespQAtV3	number(6,3)	O	Unit is in (%) Note: -ve sign refers to "sink".	Permitted range is between -100 and 100 (inclusive)
invVarRespQAtV4	number(6,3)	O	Unit is in (%) -ve sign refers to "sink".	Permitted range is between -60 and 0 (inclusive)
invReactivePowerMode	string(15)	O	Select which power quality response modes are enabled on the inverter.	Permitted values are Enabled, or Not Enabled If InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled, then this value is "Not Enabled".
invFixReactivePower	number(6,3)	O	Reactive Power. Specified in % output of the system. -ve sign refers to "sink"	Permitted range is between -100 and 100 (inclusive)
fixPowerFactorMode	string(15)	O	Select which power quality response modes are enabled on the inverter	Permitted values are Enabled, or Not Enabled If InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled, then this value is "Not Enabled".
fixPowerFactor	number(4,3)	O		Permitted range is between 0.8 and 1 (inclusive)
fixPowerFactorQuad	string(10)	O		Permitted values are Source, or Sink.
powerResponseMode	string(15)	O	Select which power quality response modes are enabled on the inverter. Permitted values are Enabled, or Not Enabled If InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled, then this value is "Not Enabled".	
referencePointP1	number(6,3)	O	Unit is in (%)	

Field	Type	Option	Description	Comments
referencePointP2	number(6,3)	O	Unit is in (%)	
powerFactorAtP1	number(4,3)	O		Permitted range is between 0.9 and 1 (inclusive)
powerFactorQuaAtP1	string(10)	O		Permitted values are Source, or Sink.
powerFactorAtP2	number(4,3)	O		Permitted range is between 0.9 and 1 (inclusive)
powerFactorQuaAtP2	string(10)	O		Permitted values are Source, or Sink.
powerRateLimitMode	string(15)	O	Select which power quality response modes are enabled on the inverter. This mode is described in AS4777.2:2015, section 6.3.5.3.3	Permitted value are Enabled, or Not Enabled
powerRampRate	number(6,3)	O	Unit is W_{Gra} . The power rate limit range shall be adjustable in the range of 5% - 100% of rated power per minute.	

3.3.3 Valid Submission Response

Item	Value
Response Code	200
Header	Standard response header attributes: Content-Type: application/json Content-Encoding: As requested [gzip, compress, deflate] Accept-Encoding: As requested [gzip, compress, deflate]
Body	TBC

3.3.4 Invalid Submission Response

Item	Value
Response Code	200

Item	Value
Header	Standard response header attributes: Content-Type: application/json Content-Encoding: As requested [gzip, compress, deflate] Accept-Encoding: As requested [gzip, compress, deflate]
Body	<pre> { "transactionId" : "string", "errors" : [{ "code": "string", "title": "string", "detail": "string", "source": "string" }] }</pre>

3.4 GET getPreferences

3.4.1 Description

This API is used by participants to get previously submitted preferences for contact details, Inverter Settings, and notifications based on approved capacity.

3.4.2 Valid Submission Response

Item	Value
Response Code	200
Header	Standard response header attributes: Content-Type: application/json Content-Encoding: As requested [gzip, compress, deflate]
Body	<pre> { "transactionId" : "string", "data" : { "contactRole" : "string", "emailAddress" : "string", "phoneNumber" : "string", "notifications" : [{ "minApprovedCapacity" : "number", "maxApprovedCapacity" : "number", </pre>

Item	Value
	<pre> "approvalRequired" : "Boolean" }], "inverterSettings" : [{ "minimumCapacity" : "number", "maximumCapacity" : "number", "details" : { "sustainOpOvervoltLimit" : "number", "stopAtOverFrequency" : "number", "stopAtUnderFrequency" : "number", "inverterVoltWattResponseMode" : "string", "inverterWattResponseV1" : "number", "inverterWattResponseV2" : "number", "inverterWattResponseV3" : "number", "inverterWattResponseV4" : "number", "inverterWattResponsePatV1" : "number", "inverterWattResponsePatV2" : "number", "inverterWattResponsePatV3" : "number", "inverterWattResponsePatV4" : "number", "inverterVoltVarResponseMode" : "string", "inverterVarResponseV1" : "number", "inverterVarResponseV2" : "number", "inverterVarResponseV3" : "number", "inverterVarResponseV4" : "number", "inverterVarResponseQatV1" : "number", "inverterVarResponseQatV2" : "number", "inverterVarResponseQatV3" : "number", "inverterVarResponseQatV4" : "number", "inverterReactivePowerMode" : "string", "inverterFixedReactivePower" : "number", "fixedPowerFactorMode" : "string", "fixedPowerFactor" : "number", "fixedPowerFactorQuadrant" : "string", "powerResponseMode" : "string", "referencePointP1" : "number", "referencePointP2" : "number", "powerFactorAtP1" : "number", "powerFactorQuadrantAtP1" : "string", "powerFactorAtP2" : "number", "powerFactorQuadrantAtP2" : "string", "powerRateLimitMode" : "string", "powerRampRate" : "number" } }] </pre>

Item	Value
	<pre>{ }</pre>

Field	Type	Description	Comments
contactRole	string(10)	Role of NSP individual in charge of the connection process	Those fields will appear on account-holders screen. They are used by account-holders to contact NSP when there is a query about connection process
emailAddress	string(50)	Email of NSP	
phoneNumber	string(15)	Phone number of NSP	

Notifications

minApprovedCapacity	number(8, 3)	Minimum approved capacity in kVA Permitted range is between 0 and 30,000	User shall be able to provide a range of values with the preferred settings. Ranges should not overlap.
maxApprovedCapacity	number(8, 3)	Maximum approved capacity in kVA Permitted range is between 0 and 30,000	
approvalRequired	string(3)	To indicate if NSP requires approving a submission that was done by Account-holders	Permitted value is either yes or no. If approvalRequired = yes, AC Connections and DER Devices within the specified range shall be "Conditional" until NSPs approve them If approvalRequired = no, AC Connections and DER Devices within the specified range shall be "Confirmed" if they passed validations If ranges are not provided, the default value shall be false, i.e. submissions by installers shall not require NSP's approval

Inverter Settings

minimumCapacity	number(8, 3)	Minimum inverter capacity in kVA	
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Field	Type	Description	Comments
maximumCapacity	number(8, 3)	Maximum inverter capacity in kVA	<p>User shall be able to provide a range of values with the preferred inverter settings.</p> <p>Ranges should not overlap</p> <p>Providing inverter settings values will auto populate them in the event of using the DER Register web interface.</p> <p>This will speed up compiling inverter data and minimise data entry errors.</p>
sustainOpOvervoltageLimit	number(7, 3)	<p>Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the $V_{nom-max}$.</p> <p>The unit is in (V)</p>	
stopAtOverFreq	number(4, 2)	Frequency (stop) In Hz	Permitted range is between 51 and 52 (inclusive)
stopAtUnderFreq	number(4, 2)	Frequency (stop) In Hz	Permitted range is between 47 and 49 (inclusive)
invVoltWattResponseMode	string(15)	This mode is described in AS4777.2:2015, section 6.3.2.1.	<p>This mode is described in AS4777.2:2015, section 6.3.2.1.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled
invWattRespV1	number(7, 3)	<p>Unit is in (V)</p> <p>Permitted range is between 200 and 300 (inclusive)</p>	These settings are described in AS4777.2:2015, section 6.3.2.1.
invWattRespV2	number(7, 3)	<p>Unit is in (V)</p> <p>Permitted range is between 216 and 230 (inclusive)</p>	
invWattRespV3	number(7, 3)	Permitted range is between 235 and 255 (inclusive)	
invWattRespV4	number(7, 3)	<p>Unit is in (V)</p> <p>Permitted range is between 244 and 265 (inclusive)</p>	

Field	Type	Description	Comments
invWattRespPAtV1	number(6, 3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAtV2	number(6, 3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAtV3	number(6, 3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAtV4	number(6, 3)	Unit is in (%) Permitted range is between 0 and 20 (inclusive)	
invVoltVarRespMode	string(15)		<p>This mode is described in AS4777.2:2015, section 6.3.2.1.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled
invVarRespV1	number(7, 3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	This mode is described in AS4777.2:2015, section 6.3.2.1.
invVarRespV2	number(7, 3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	
invVarRespV3	number(7, 3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	
invVarRespV4	number(7, 3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	
invVarRespQAtV1	number(6, 3)	Unit is in (%) Permitted range is between 0 and 60 (inclusive)	

Field	Type	Description	Comments
invVarRespQAtV2	number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	
invVarRespQAtV3	number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	
invVarRespQAtV4	number(6,3)	Unit is in (%) Permitted range is between -60 and 0 (inclusive) -ve sign refers to "sink".	
invReactivePowerMode	string(15)	Select which power quality response modes are enabled on the inverter.	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>
invFixReactivePower	number(6,3)	Reactive Power. Specified in % output of the system. -ve sign refers to "sink"	Permitted range is between -100 and 100 (inclusive)
fixPowerFactorMode	string(15)	Select which power quality response modes are enabled on the inverter	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>
fixPowerFactor	number(4,3)		Permitted range is between 0.8 and 1 (inclusive)
fixPowerFactorQuad	string(10)		<p>Permitted Value is one of the following:</p> <p>Source</p> <p>Sink</p>

Field	Type	Description	Comments
powerRespMode	string(15)	Select which power quality response modes are enabled on the inverter.	Permitted Value is one of the following: <ul style="list-style-type: none"> Enabled Not Enabled It should = "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.
referencePointP1	number(6, 3)	Unit is in (%)	The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installation.
referencePointP2	number(6, 3)	Unit is in (%)	
powerFactorAtP1	number(4, 3)	Permitted range is between 0.9 and 1 (inclusive)	Permitted Value is one of the following: <ul style="list-style-type: none"> Source Sink
powerFactorQuadAtP1	string(10)	Permitted Value is one of the following: <ul style="list-style-type: none"> Source Sink 	
powerFactorAtP2	number(4, 3)	Permitted range is between 0.9 and 1 (inclusive)	Permitted Value is one of the following: <ul style="list-style-type: none"> Source Sink
powerFactorQuadAtP2	string(10)	Permitted Value is one of the following: <ul style="list-style-type: none"> Source Sink 	
powerRateLimitMode	string(15)	Select which power quality response modes are enabled on the inverter.	This mode is described in AS4777.2:2015, section 6.3.5.3.3. Permitted Value is one of the following: <ul style="list-style-type: none"> Enabled Not Enabled
powerRampRate	number(6, 3)	Unit is WGr, The power rate limit range shall be adjustable in the range of 5% - 100% of rated power per minute	As described in AS4777.2:2015, section 6.3.5.1.

3.5 POST getDERSummary

3.5.1 Description

This API is used by participants to get a single or multiple DER Records along with their details based on the supplied filters. It uses an AND connector and the returned data contains all data for the specified NMI.

- The returned data is the latest version stored in DER Register.
- This API does not return historical versions.
- The returned file size is to be confirmed.

Note: This API returns all confirmed and conditional records with Active or/and Decommissioned AC Connections and DER Devices. It does not return deleted "Initial" and "Idle" AC Connections and DER Devices. (See 2.8, Installation stage.)

3.5.2 Request

Item	Value
URL Path	/getDERSummary
Method	POST
Header	Standard request header attributes, be sure to include: Authorization: Basic Content-Encoding: Should be one of [gzip, deflate, compress] Accept-Encoding: Should be one or more of [gzip, deflate, compress]

Item	Value
Body	<pre>{ "data" : { "nmis" : ["string"], "installerId" : "string", "accessRequested" : "boolean", "exceptionCodes" : ["string"], "modifiedDateFrom" : "string", "modifiedDateTo" : "string", "submitterClass" : "string", "acConnection" : { "equipmentType" : "string", "commissioningDateFrom" : "string", "commissioningDateTo" : "string", "status" : "string", "installationStages" : ["string"] }, "device" : { "types" : ["string"], "status" : "string", "installationStages" : ["string"] } } }</pre>

Field	Appl ies Whe n	Type	Option	Description	Comments
nmis		string(10)	O	Unique identifier for each connection point where DER installation has been installed/approved.	The user shall be able to pass multiple NMIs
installerId		string(50)	O	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).
accessRequested		string(3)	O	This is used when Account-holders requested an access for a certain job number	Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
exceptionCodes		number(4)	O	Code used to indicate the type of exception	Permitted codes are provided in Validation Rules

modified DateFrom		string (YYYY-MM-DDTHH:mm:ss.sssZ)	O	From update date for a DER Record	
modified DateTo		string (YYYY-MM-DDTHH:mm:ss.sssZ)	O	To update date for a DER Record	
submitter Class		string(9)	O	To determine the submitted class.	Permitted value is one of the following: - NSP - Installer
acConnection					
equipmentType		string(20)	O	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted value is one of the following: - Inverter - Other
commissioningDate From		Date	O	From Commissioning date for AC Connection	

commissioningDateTo	Date	O	To Commissioning date for AC Connection	
status	string(20)	O	<p>Code used to indicate the status of the DER Device. This will be used to identify if a Device is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and</p>	<p>This status is only applicable on DER Device. This is not a duplicate of the NMI level status, as Devices may become active or inactive without a change of status to the overall system.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> - Inactive - Active - Decommissioned Inactive: an DER Device record that is created but that DER Device is NOT physically installed or operating yet. <p>Active: an DER Device record that is physically installed and operating</p> <p>Decommissioned: an DER Device that used to operate, and it is NOT operating any more.</p>

may be backdated.				
installationStages		string(11)	O	<p>Installation stage of the AC connection. This will be used to indicate to the user if the AC Connection is initial, conditional, confirmed, or idle. See 2.8, Installation stage.</p> <p>Permitted value to be returned is one of the following:</p> <ul style="list-style-type: none"> - Initial - Conditional - Confirmed - Idle
Device				
types		string(50)	O	<p>Used to indicate the primary technology used in the DER device.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other
status		string(20)	O	<p>Code used to indicate the status of the DER Device. This will be used to identify if a Device is active or inactive or decommissioned.</p> <p>This status is only applicable on DER Device. This is not a duplicate of the NMI level status, as Devices may become active or inactive without a change of status to the overall system.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> - Inactive - Active

				<p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p>	<p>- Decommissioned</p> <p>Inactive: an DER Device record that is created but that DER Device is NOT physically installed or operating yet.</p> <p>Active: an DER Device record that is physically installed and operating</p> <p>Decommissioned: an DER Device that used to operate, and it is NOT operating any more.</p>
installatio nStages		string(11)	O	<p>Installation stage of the DER Device.</p> <p>This will be used to indicate to the user if the DER Device is initial, conditional, confirmed, or idle.</p> <p>See 2.8, Installation stage.</p>	<p>Permitted value to be returned is one of the following:</p> <ul style="list-style-type: none"> - Initial - Conditional - Confirmed - Idle

3.5.3 Valid Submission Response

Item	Value
Response Code	200
Header	<p>Standard response header attributes:</p> <p>Content-Type: application/json</p> <p>Content-Encoding: As requested [gzip, compress, deflate]</p>
Body	<pre> { "transactionId" : "string", "data" : { "derRecords" : [{ "nmi" : "string", "jobNumber" : "string", "recordUpdateDate" : "string", "approvedCapacity": "number", "availablePhasesCount" : "number", "installedPhasesCount": "number", "islandableInstallation" : "string", "centralProtectionControl" : "string", "exportLimitkva" : "number", "underFrequencyProtection" : "number", "underFrequencyProtectionDelay" : "number", "overFrequencyProtection" : "number", "overFrequencyProtectionDelay" : "number", "underVoltageProtection" : "number", "underVoltageProtectionDelay" : "number", "overVoltageProtection" : "number", "overVoltageProtectionDelay" : "number", "sustainedOverVoltage" : "number", "sustainedOverVoltageDelay" : "number", "frequencyRateOfChange" : "number", "voltageVectorShift" : "number", "interTripScheme" : "string", "neutralVoltageDisplacement" : "number", "installerId" : "string", "submitterId" : "string", "submitterClass" : "string", "accessRequested" : "boolean", "comments" : "string", "acConnections": [{ "connectionId" : "number", "nspConnectionId" : "string", "recordCreationDate" : "string", "recordConfirmedDate" : "string", </pre>

```

"recordEndDate" : "string",
"commissioningDate" : "string",
"installationStage" : "string",
"equipmentType" : "string",
"cecConnectionId" : "string",
"count" : "number",
"statusCode" : "string",
"frequencyRateOfChange" : "number",
"voltageVectorShift" : "number",
"interTripScheme" : "string",
"neutralVoltageDisplacement" : "number",
"details" :
{
    "dredInverterInteraction" : "string",
    "serialNumbers" : ["string"],
    "manufacturerOther" : "boolean",
    "manufacturerName" : "string",
    "modelOther" : "boolean",
    "modelName" : "string",
    "inverterSeriesOther" : "boolean",
    "inverterSeries" : "string",
    "inverterStandard" : "string",
    "inverterDeviceCapacity" : "number",
    "sustainOpOvervoltLimit" : "number",
    "stopAtOverFreq" : "number",
    "stopAtUnderFreq" : "number",
    "invVoltWattRespMode" : "string",
    "invWattRespV1" : "number",
    "invWattRespV2" : "number",
    "invWattRespV3" : "number",
    "invWattRespV4" : "number",
    "invWattRespPAtV1" : "number",
    "invWattRespPAtV2" : "number",
    "invWattRespPAtV3" : "number",
    "invWattRespPAtV4" : "number",
    "invVoltVarRespMode" : "string",
    "invVarRespV1" : "number",
    "invVarRespV2" : "number",
    "invVarRespV3" : "number",
    "invVarRespV4" : "number",
    "invVarRespQAtV1" : "number",
    "invVarRespQAtV2" : "number",
    "invVarRespQAtV3" : "number",
    "invVarRespQAtV4" : "number",
    "invReactivePowerMode" : "string",
    "invFixReactivePower" : "number",
    "fixPowerFactorMode" : "string",
    "fixPowerFactor" : "number",
    "fixPowerFactorQuad" : "string",
    "powerRespMode" : "string",
    "referencePointP1" : "number",
    "referencePointP2" : "number",
    "powerFactorAtP1" : "number",
    "powerFactorQuadAtP1" : "string",
    "powerFactorAtP2" : "number",

```

```

"powerFactorQuadAtP2" : "string",
"powerRateLimitMode" : "string",
"powerRampRate" : "number",
"reactivePowerRegulation" : "string",
"voltageSetPoint" : "number",
"voltageSetPointUnit" : "string",
"deadband" : "number",
"droop" : "number",
"baseForDroop" : "number",
"reactivePowerSourceLimit" : "number",
"reactivePowerSinkLimit" : "number",
"reactiveFixPowerFactor" : "number",
"reactiveFixPowerFactorQuad" :
"string",
"generatorRampRate" : "number",
"powerRampGradient" : "number",
"frequencySensitiveMode" : "string",
"frequencyDeadband" : "number",
"frequencyDroop" : "number"
},
"devices" :
[
{
"deviceId" : "number",
"nspDeviceId" : "string",
"recordCreationDate" : "string",
"recordCommissioningDate" :
"string",
"recordConfirmedDate" : "string",
"recordEndDate" : "string",
"cecDeviceId" : "string",
"type" : "string",
"subType" : "string",
"count" : "number",
"status" : "string",
"installationStage" : "string",
"details" :
{
"typeOther" : "boolean",
"subTypeOther" : "boolean",
"manufacturerOther" :
"boolean",
"manufacturerName" : "string",
"modelOther" : "boolean",
"modelName" : "string",
"nominalRatedCapacity" :
"number",
"nominalStorageCapacity" :
"number"
}
}
]
},
"exceptions" :

```

3. NSP APIs, 3.5 POST getDERSummary 3.5.3 Valid Submission Response

```

[
  {
    "exceptionId" : "number",
    "code" : "number",
    "name" : "string",
    "affectedAttributes" : ["string"],
    "details" : "string",
    "status" : "string",
    "deviceId" : "number",
    "connectionId" : "number",
    "nspAcknowledged" : "string"
  }
]
},
"warnings":
[
  {
    "code": "string",
    "title": "string",
    "detail": "string",
    "source": "string"
  }
]
}

```

Field	Applies When	Type		Comments
nmi	N/A	string(10)	Unique identifier for each connection point where DER installation has been installed/approved	
jobNumber	N/A	string(30)	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works	This identifier is specified by the NSP as per their connection process. This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.

3. NSP APIs, 3.5 POST getDERSummary 3.5.3 Valid Submission Response

Field	Applies When	Type		Comments
recordUpdateDate	N/A	string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Record was updated.	AEMO will store a history of all versions changes and it can be tracked via this date. A new version is generated every time a new submission or update happens
approvedCapacity	N/A	number(8,3)	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Can be distinct or equal to an export limitation. Permitted range is between 0 and 30,000
availablePhasesCount	N/A	number(1)	The number of phases available for the installation of DER.	Permitted value is one of the following: <ul style="list-style-type: none"> • 1 • 2 • 3
installedPhasesCount	N/A	number(1)	The number of phases that DER is connected to.	Permitted value is one of the following: <ul style="list-style-type: none"> • 1 • 2 • 3
islandableInstallation	N/A	string(3)	For identification of small generating units designed with the ability to operate in an islanded mode.	Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
centralProtectionControl	See 3.9.2, page 170.	string(3)	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Used to describe the type(s) of central protection to be applied to the DER system. Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No

Field	Applies When	Type		Comments
exportLimitkva	See 3.9.2, page 170.	number(8,3)	Export limit (kVA) Maximum amount of power (kVA) that may be exported from a connection point to the grid, as monitored by a control / relay function. A null value indicates no limit. Permitted range is between 0 and 30,000	
underFrequencyProtection	See 3.9.2, page 170.	number(4,2)	Under frequency protection in Hz Permitted range is between 45 and 50 (inclusive)	Described in AS4777.1:2016 Table 2.
underFrequencyProtectionDelay	See 3.9.2, page 170.	number(4,3)	Under frequency protection delay in seconds	
overFrequencyProtection	See 3.9.2, page 170.	number(4,2)	Over frequency protection in Hz Permitted range is between 50 and 55 (inclusive)	Described in AS4777.1:2016 Table 2.
underVoltageProtection	See 3.9.2, page 170.	number(9,3)	Under voltage protection in volts (V)	Described in AS4777.1:2016 Table 2.
underVoltageProtectionDelay	See 3.9.2, page 170.	number(4,3)	Under voltage protection delay in seconds	
overVoltageProtection1	See 3.9.2, page 170.	number(9,3)	Over voltage protection in volts (V)	
overVoltageProtection1Delay	See 3.9.2, page 170.	number(4,3)	Over voltage protection delay in seconds	
overVoltageProtection2	See 3.9.2, page 170.	number(9,3)	Over voltage protection in volts (V)	

Field	Applies When	Type		Comments
frequencyRateOfChange	See 3.9.2, page 170.	number(4,3)	Rate of change of frequency trip point (Hz/s). Permitted range is between 0 and 4 (inclusive)	
voltageVectorShift	See 3.9.2, page 170.	number(4,2)	Trip angle (Deg)	
interTripScheme	See 3.9.2, page 170.	string(100)	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement	See 3.9.2, page 170.	number(7,3)	Trip voltage (V)	
installerId		string(50)	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).
submitterId		string(50)	Records the userid that submitted this record	This is system generated by AEMO.
submitterClass		string(9)	Records the user classification whether it is NSP or others	Can be either "NSP" or "Installer"
submitMode		Varchar(6)		This attribute is NOT applicable to NSPs. It is to be used by Account-holders. Any submitted value by NSP shall be rejected Permitted values is one of the following: a) Save b) Submit

Field	Applies When	Type		Comments
comments		string(2000)	Comments to help with DER Submission.	This field shall help NSPs to write notes that help with the "Connection Process". These comments for NSP internal use only.
acConnections				
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	This is system generated by AEMO.
nspConnectionId		string(50)	An AC Connection identifier that is used by NSP internally	This is provided to assist participants with linking their internal ID with AEMO's generated connectionId
recordCreationDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record was created.	System generated and it is the date that the AC Connection gets submitted for the first time
recordConfirmedDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record becomes "Confirmed" for the first time	System generated. This date in combination with AC Connection commissioning date are needed to monitor / manage obligation on timeframe to complete submission of record.

Field	Applies When	Type		Comments
recordEndDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record ends or becomes decommissioned	System generated If DER Record is "Initial" or "Idle" and it is removed, this date will capture the removal date. If DER Record is "Conditional" or "Confirmed" and it is decommissioned, this date will capture the decommissioning date.
commissioningDate		string (YYYY-MM-DD)	The date that an AC Connection becomes "Active"	This date and AC Connection RecordConfirmedDate are needed to monitor / manage obligation on timeframe to complete submission of AC Connection. Commissioning date can be in the past, present or the future
installationStage		string(11)	Installation stage of the AC connection. This will be used to indicate to the user if the AC Connection is initial, conditional, confirmed, or idle. See 2.8, Installation stage.	Permitted value to be returned is one of the following: - Initial - Conditional - Confirmed - Idle
equipmentType		string(20)	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted value is one of the following: - Inverter - Other

Field	Applies When	Type		Comments
cecConnectionId		string(30)	Unique device identifier to store CEC inverter reference data	This ID shall be returned if the submitted inverter is accredited
count		number(2)	Number of AC Connections in the group. For the suite of AC Connections to be considered as a group, all the AC Connections included must have the same attributes.	
statusCode		string(20)	<p>Code used to indicate the status of the AC Connection. This will be used to identify if an AC Connection is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • Inactive • Active • Decommissioned 	<p>This status is only applicable on AC Connections. This is not a duplicate of the NMI level status, as inverters may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an AC Connection record that is created but that AC Connection is NOT physically installed or operating yet.</p> <p>Active: an AC Connection record that is physically installed and operating</p> <p>Decommissioned: an AC Connection that used to operate, and it is NOT operating any more.</p>
frequencyRateOfChange		number(4,3)	<p>Rate of change of frequency (Hz/s)</p> <p>Permitted value is between 0 and 4 (inclusive)</p>	

Field	Applies When	Type		Comments
voltageVectorShift		number(4,2)	Trip angle (Deg.)	
interTripScheme		string(100)	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement		number(7,3)	Trip voltage (V)	
dredInverterInteraction	If equipmentType = inverter	string(3)		Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
serialNumbers		string(array)	The serial number of the device(s)	<p>If the equipment type = Inverter, the number of Serial Numbers (where entered) required must match the number of AC Connections.</p> <p>For example, if "count" = 3, then "serialNumbers" (where entered) must = 3.</p> <ul style="list-style-type: none"> - For NSP APIs, "serialNumbers" can be NULL. - For Account-holder APIs, "serialNumbers" must be entered and the above rule applies or the API will return an Exception 1021. <p>The maximum number of serial numbers permissible is 999.</p>

3. NSP APIs, 3.5 POST getDERSummary 3.5.3 Valid Submission Response

Field	Applies When	Type		Comments
manufacturerOther		boolean	This is used to indicate if a manufacturer is accredited	Permitted value is one of the following: - true - false
manufacturerName	If equipmentType = inverter	string(120)	The name of the inverter manufacturer	Using DER Web, a list of accredited manufactures will be listed. If selected value = Other, the user needs to specify
modelOther		boolean	This is used to indicate if a model number is accredited	Permitted value is one of the following: - true - false
modelName		string(120)	The model number of the inverter.	Using DER Web, a list of accredited model numbers will be listed. If selected value = Other, the user needs to specify.
inverterSeriesOther		boolean	This is used to indicate if an inverter series is accredited	Permitted value is one of the following: - true - false
inverterSeries		string(50)	The inverter series.	Using DER Web, a list of accredited model numbers will be listed. If selected value = Other, the user needs to specify.

Field	Applies When	Type		Comments
inverterStandard		string(100)	<p>What standard/s is the inverter manufactured, tested and installed to?</p> <p>Examples include AS4777.2:2015, IEC 62109-1 and IEC 62019-2.</p>	<p>Using DER web, if the selected "modelName" is accredited, this value will be auto-populated.</p> <p>If "modelName" is equal to "Other" This value will be entered manually</p> <p>The auto-populated value is obtained from reference data</p>
inverterDeviceCapacity		number(9,3)	<p>The rated AC output power that is listed in the product specified by the manufacturer.</p> <p>This value refers to a single device.</p>	<p>Using DER web, if the selected "modelName" is accredited, this value will be auto-populated.</p> <p>If "modelName" is equal to "Other" This value will be entered manually</p> <p>The auto-populated value is obtained from reference data</p>
sustainOpOvervolt Limit		number(7,3)	<p>Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the $V_{nom-max}$.</p> <p>The unit is in (V)</p>	<p>Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p>
stopAtOverFreq		number(4,2)	<p>Frequency (stop) In Hz</p> <p>Permitted range is between 51 and 52 (inclusive)</p>	

Field	Applies When	Type		Comments
stopAtUnderFreq		number(4,2)	Frequency (stop) In Hz Permitted range is between 47 and 49 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them
invVoltWattRespMode	If equipmentType = inverter	string(15)	Permitted Value is one of the following: Permitted Value is one of the following: Enabled Not Enabled	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API
invWattRespV1	If invVoltWattRespMode = Enabled	number(7,3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them This mode is described in AS4777.2:2015, section 6.3.2.1.
invWattRespV2		number(7,3)	Unit is in (V) Permitted range is between 216 and 230 (inclusive)	
invWattRespV3		number(7,3)	Permitted range is between 235 and 255 (inclusive)	
invWattRespV4		number(7,3)	Unit is in (V) Permitted range is between 244 and 265 (inclusive)	
invWattRespPATV1		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPATV2		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPATV3		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	

Field	Applies When	Type	Comments
invWattRespPAtV4		number(6,3)	Unit is in (%) Permitted range is between 0 and 20 (inclusive)
invVoltVarRespMode	If equipmentType = inverter	string(15)	Permitted Value is one of the following: Enabled Not Enabled
invVarRespV1	If invVoltVarRespMode = Enabled	number(7,3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)
invVarRespV2		number(7,3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)
invVarRespV3		number(7,3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)
invVarRespV4		number(7,3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)
invVarRespQAtV1		number(6,3)	Unit is in (%) Permitted range is between 0 and 60 (inclusive)
invVarRespQAtV2		number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"

Field	Applies When	Type		Comments
invVarRespQAtV3		number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	
invVarRespQAtV4		number(6,3)	Unit is in (%) Permitted range is between -60 and 0 (inclusive) -ve sign refers to "sink".	
invReactivePower Mode	If equipmentType = inverter	string(15)	Select which power quality response modes are enabled on the inverter. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.	
invFixReactivePower	If invReactivePowerMode = Enabled	number(6,3)	Reactive Power. Specified in % output of the system. Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range Auto-populated values are based on

Field	Applies When	Type		Comments
fixPowerFactorMode	If equipmentType = inverter	string(15)	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	<p>preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API , the user shall manually provide them</p>
fixPowerFactor	If fixPowerFactorMode = Enabled	number(4,3)	Permitted range is between 0.8 and 1 (inclusive)	
fixPowerFactorQuand		string(10)	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Source • Sink 	
powerRespMode	If equipmentType = inverter	string(15)	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled <p>It should = "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	
referencePointP1	If powerResp	number(6,3)	Unit is in (%)	
referencePointP2		number(6,3)	Unit is in (%)	Using DER Web, these values will be auto-populated

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Field	Applies When	Type		Comments
powerFactorAtP1	Mode = Enabled	number(4,3)	Permitted range is between 0.9 and 1 (inclusive)	based on "Inverter Device Capacity" range
powerFactorQuadAtP1		string(10)	Permitted Value is one of the following: Source Sink	Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API
powerFactorAtP2		number(4,3)	Permitted range is between 0.9 and 1 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them
powerFactorQuadAtP2		string(10)	Permitted Value is one of the following: <ul style="list-style-type: none"> • Source • Sink 	The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installation.

Field	Applies When	Type		Comments
powerRateLimitMode	If equipmentType = inverter	string(15)	Select which power quality response modes are enabled on the inverter.	<p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API , the user shall manually provide them</p> <p>This mode is described in AS4777.2:2015, section 6.3.5.3.3.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled

Field	Applies When	Type		Comments
powerRampRate	If powerRateLimitMode = Enabled	number(6,3)	Unit is W _{Gra} . The power rate limit range shall be adjustable in the range of 5 - 100 of rated power per minute	Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values provided in submitPreferences API, the user shall manually provide them As described in AS4777.2:2015, section 6.3.5.1.
reactivePowerRegulation	If equipmentType = inverter	string(20)		Permitted Value is one of the following: <ul style="list-style-type: none"> • None • Voltage droop • Fixed power factor
voltageSetPoint	If reactivePowerRegulation = Voltage droop	number(9,3)	The set voltage point	
voltageSetPointUnit		string(1)	The unit for voltageSetPoint	Permitted Value is one of the following: <ul style="list-style-type: none"> • % • V
deadband		number(6,3)	± x%	
droop		number(5,3)	In %	
baseForDroop		number(8,3)	In kVA	
reactivePowerSourceLimit		number(8,3)	In Var	

Field	Applies When	Type		Comments
reactivePowerSinkLimit		number(8,3)	In Var	
reactiveFixPowerFactor	If reactivePowerRegulation = Fixed	number(4,3)		Permitted range is between 0 and 1 (inclusive)
reactiveFixPowerFactorQuad	power factor	string(10)		Permitted Value is one of the following: <ul style="list-style-type: none"> • Source • Sink
generatorRampRate	If equipmentType = inverter	string(15)		A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled
powerRampGradient	If generatorRampRate = Enabled	number(6,3)	Power ramp rate (%/min)	Permitted range is between 0 and 100 (inclusive)
frequencySensitiveMode	If equipmentType = inverter	string(15)		A generator may operate in a frequency sensitive mode whereby it adjusts output to help support frequency control. A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled
frequencyDeadband	If frequencySensitiveMode = Enabled	number(6,3)	In Hz	
frequencyDroop		number(4,2)	In %	

Field	Applies When	Type		Comments
devices				
deviceld		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO. Permitted value is either:</p> <ul style="list-style-type: none"> - Null; or - an existing deviceld that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceld is none of the above.</p> <p>Null shall be used in the event of adding a new record</p> <p>Existing deviceld will be used for updating an existing record</p>
nspDeviceld		string(50)	A DER Device identifier that is used by NSP internally	This is provided to assist participants with linking their internal ID with AEMO's generated deviceld
recordCreationDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record was created.	
recordCommissioningDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record became active.	<p>This will either equal to: Commissioning date of the AC Connection linked to it, if they were created on the same date; OTHERWISE</p> <p>The date that the DER Device status becomes "Active"</p> <p>recordCommissioningDate can be in the past, or present</p>

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Field	Applies When	Type		Comments
recordConfirmedDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record became "Confirmed" for the first time	System generated. This date in combination with Device recordCommissioningDate are needed to monitor / manage obligation on timeframe to complete submission of record.
recordEndDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record ends/decommissioned	System generated If DER Record is "Initial" or "Idle" and it is removed, this date will capture the removal date. If DER Record is "Conditional" or "Confirmed" and it is decommissioned, this date will capture the decommissioning date.
cecDeviceId		string(30)	Unique device identifier to store CEC Device reference data	This ID shall be returned if the submitted device is accredited

Field	Applies When	Type		Comments
type		string(50)	Used to indicate the primary technology used in the DER device.	<p>Expected Value is one of the following:</p> <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other <p>"Other" is only applicable in the web portal. Selecting "Other" will request the user to specify.</p> <p>Using API, it is accepted to submit a device type that is not in the list. There is no validation applied on this.</p>

subType	string(50)	Used to indicate the primary technology used in the DER device.	<p>This field is also used to record for example the battery chemistry, or the type of PV panel. It is also used to record if a battery is contained in an electric vehicle connected in a vehicle-to-grid arrangement.</p> <p>If Type = Solar PV, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Monocrystalline - Polycrystalline - Crystalline - Thin-film - Concentrating PV - Silicon - Biohybrid - Cadmium telluride - Other <p>If Type = Storage, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Lithium-ion - Lead acid - Lead carbon - Sodium nickel - Lead crystal - Absorbed glass matt - Vanadium - Aqueous hybrid ion - Tubular gel - Zinc bromide - Electric Vehicle - Other <p>If Type != Solar PV or Storage, the permitted value is "Other"</p> <p>"Other" is only applicable in the web portal. Selecting "Other" will request the user to specify</p> <p>Using API, it is accepted to submit a device sub-type that is not in the list. There is no</p>
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Field	Applies When	Type		Comments
				validation applied on this.
count		number(2)	Number of devices in the group of DER devices.	
status		string(20)	<p>Code used to indicate the status of the DER Device. This will be used to identify if a Device is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • Inactive • Active • Decommissioned 	<p>This status is only applicable on DER Device. This is not a duplicate of the NMI level status, as Devices may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an DER Device record that is created but that DER Device is NOT physically installed or operating yet.</p> <p>Active: an DER Device record that is physically installed and operating</p> <p>Decommissioned: an DER Device that used to operate, and it is NOT operating any more.</p>
installationStage		string(11)	<p>Installation stage of the DER Device.</p> <p>This will be used to indicate to the user if the DER Device is initial, conditional, confirmed, or idle.</p> <p>See 2.8, Installation stage.</p>	<p>Permitted value to be returned is one of the following:</p> <ul style="list-style-type: none"> - Initial - Conditional - Confirmed - Idle

Field	Applies When	Type		Comments
typeOther	If type = Other	boolean	To indicate if the submitted device type is part of the provided list	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> - true - false <p>If the submitted device "type" is one of the list provided below, the returned value shall be false</p> <p>If the submitted device "type" is NOT one of the list provided below, the returned value shall be false</p>
subTypeOther	If subType = Other	boolean	To indicate if the submitted device subtype is part of the provided list	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • true • false <p>If the submitted device "subType" is one of the list provided below, the returned value shall be false</p> <p>If the submitted device "subType" is NOT one of the list provided below, the returned value shall be true</p>
manufacturerOther		boolean	This is used to indicate if a manufacturer is accredited	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • true • false
manufacturerName		string(120)	The name of the device manufacturer	Definitions align to the approved modules list.
modelOther		boolean	This is used to indicate if a model number is accredited	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • true • false
modelName		string(120)	The model number of the device.	Definitions align to the approved modules list.

Field	Applies When	Type		Comments
nominalRatedCapacity		number(8,3)	Maximum output in kVA that is listed in the product specification by the manufacturer. This refers to the capacity of each unit within the device group.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually The auto-populated value is obtained from reference data
nominalStorageCapacity	If Type = Storage	number(9,3)	Maximum storage capacity in kWh. This refers to the capacity of each storage module within the device group.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually The auto-populated value is obtained from reference data
exceptions				
exceptionId		number	A unique identification for an exception generated when business validation fails	This Id is integer value and will be generated by AEMO upon a submission that fails business validation Permitted value of submission is one of the following: an existing exceptionId that was previously generated by AEMO Null If the ExceptionId was not generated by AEMO, the system will reject the submission.
code		number(4)	Code used to indicate the type of exception	

3. NSP APIs, 3.5 POST getDERSummary 3.5.3 Valid Submission Response

Field	Applies When	Type		Comments
name		string(20)	Name of exception	
AffectedAttributes		string(300)	Lists the names of fields that were the reason for producing this exception	
details		string(200)	Description of the exception	
status		string(6)	Status of exception (Open or closed)	Permitted values is one of the following: <ul style="list-style-type: none"> • Open • Closed
deviceid		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO.</p> <p>Permitted value is either:</p> <ul style="list-style-type: none"> • Null; or • an existing deviceid that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceid is none of the above.</p> <p>Null shall be used in the event of adding a new record</p> <p>Existing deviceid will be used for updating an existing record</p>

Field	Applies When	Type		Comments
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	<p>This is system generated by AEMO.</p> <p>Permitted value is either:</p> <ul style="list-style-type: none"> • Null; or • an existing connectionId that has been previously generated by AEMO <p>AEMO's system will reject submission if connectionId is none of the above.</p> <p>Null shall be used in the event of adding a new record</p> <p>Existing connectionId will be used for updating an existing record</p>
nspAcknowledged		string(3)	<p>This is used when there is an exception but the user acknowledges it without resolving/editing the exception.</p> <p>For example, if model number is not accredited, AEMO will generate an exception. The user will have the ability to acknowledge it and exception will be closed.</p>	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> - Yes - No <p>Yes indicates that the user acknowledged the exception and record will become "Confirmed" (provided no other exceptions).</p> <p>No will do nothing to the exception and it will stay open.</p>

3. NSP APIs, 3.5 POST getDERSummary 3.5.3 Valid Submission Response

Field	Applies When	Type		Comments
receipt				
nmi		string(10)	Unique identifier for each connection point where DER installation has been installed/approved	
jobNumber		string(30)	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	This identifier is specified by the NSP as per their connection process. This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
disclaimer		string	Standard disclaimer information provided to Account-holders after submitting DER record details.	Only returned to Account-holders. For NSPs, this is returned as null.
derJobCompleteDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when all AC Connections and DER Devices for a certain job become "Confirmed". It is the date that receipt is generated	System generated.
installerId		string(50)	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).

Field	Applies When	Type		Comments
approvedCapacity		number(8,3)	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Can be distinct or equal to an export limitation. Permitted range is between 0 and 30,000
confirmationLengthTime		number(6,3)	The time of how long it took a job to be complete since records were active	The number of business days between derJobCompleteDate and the last commissioningDate/recordCommissioningDate for a DER Record during a certain job
centralProtectionControl		string(3)	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Used to describe the type(s) of central protection to be applied to the DER system. Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
receipt acConnections				
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	This is system generated by AEMO.
equipmentType		string(20)	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted value is one of the following: <ul style="list-style-type: none"> • Inverter • Other

Field	Applies When	Type		Comments
installedCapacity	If EquipmentType= Inverter	number(8,3)	The total capacity of inverter that are installed during a certain job	It is a calculated value. It represents what is the total inverter capacity that is physically installed at site for a certain job number
manufacturerName		string(120)		Only returned to account-holders. For NSPs, this is returned as null.
modelName		string(120)		Only returned to account-holders. For NSPs, this is returned as null.
receipt devices				
deviceId		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	This is system generated by AEMO.
type		string(50)	Used to indicate the primary technology used in the DER device.	Expected Value is one of the following: <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other Other values might be returned depends on the submitted Device "type".

Field	Applies When	Type		Comments
installedCapacity		number(8,3)	The total capacity of DER Devices installed during a job	It is a calculated value. It represents what is the total device capacity that is physically installed at site for a certain job number
manufacturerName		string(120)		Only returned to account-holders. For NSPs, this is returned as null.
modelName		string(120)		Only returned to account-holders. For NSPs, this is returned as null.

3.6 POST getDER

3.6.1 Description

This API is used by participants to get a complete history of versions for a single DER Record. The returned file size is to be confirmed.

Note: This API returns all AC connections and DER devices, regardless of their status.

3.6.2 Request

Item	Value
URL Path	/getDER
Method	POST
Header	Standard request header attributes, be sure to include: Authorization: Basic Content-Encoding: Should be one of [gzip, deflate, compress] Accept-Encoding: Should be one or more of [gzip, deflate, compress]

Item	Value
Body	<pre> { "data" : { "derRecords" : [{ "nmi" : "string", "jobNumber" : "string", "required": ["nmi"] }] } }</pre>

Field	Type	Option	Description	Comments
nmi	string(10)	M	Unique identifier for each connection point where DER installation has been installed/approved	The user shall be able to pass only one NMI
jobNumber	string(30)	O	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	<p>This identifier is specified by the NSP as per their connection process.</p> <p>This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.</p>

3.6.3 Valid Submission Response

Item	Value
Response Code	200
Header	<p>Standard response header attributes:</p> <p>Content-Type: application/json</p> <p>Content-Encoding: As requested [gzip, compress, deflate]</p>

Body

```

{
  "transactionId" : "string",
  "data" :
  {
    "derRecords" :
    [
      {
        "nmi" : "string",
        "jobNumber" : "string",
        "recordUpdateDate" : "string",
        "approvedCapacity": "number",
        "availablePhasesCount" : "number",
        "installedPhasesCount": "number",
        "islandableInstallation" : "string",
        "centralProtectionControl" : "string",
        "exportLimitkva" : "number",
        "underFrequencyProtection" : "number",
        "underFrequencyProtectionDelay" : "number",
        "overFrequencyProtection" : "number",
        "overFrequencyProtectionDelay" : "number",
        "underVoltageProtection" : "number",
        "underVoltageProtectionDelay" : "number",
        "overVoltageProtection" : "number",
        "overVoltageProtectionDelay" : "number",
        "sustainedOverVoltage" : "number",
        "sustainedOverVoltageDelay" : "number",
        "frequencyRateOfChange" : "number",
        "voltageVectorShift" : "number",
        "interTripScheme" : "string",
        "neutralVoltageDisplacement" : "number",
        "installerId" : "string",
        "submitterId" : "string",
        "submitterClass" : "string",
        "submitMode" : "string",
        "accessRequested" : "boolean",
        "comments" : "string",
        "acConnections":
        [
          {
            "connectionId" : "number",
            "nspConnectionId" : "string",
            "recordCreationDate" : "string",
            "recordUpdateDate" : "string",
            "recordConfirmedDate" : "string",
            "recordEndDate" : "string",
            "commissioningDate" : "string",
            "installationStage" : "string",
            "equipmentType" : "string",
            "cecConnectionId" : "string",
            "count" : "number",
            "statusCode" : "string",
            "frequencyRateOfChange" : "number",
            "voltageVectorShift" : "number",
            "interTripScheme" : "string",

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"neutralVoltageDisplacement" : "number",
"details" :
{
"dredInverterInteraction" : "string",
"serialNumbers" : ["string"],
"manufacturerOther" : "boolean",
"manufacturerName" : "string",
"modelOther" : "boolean",
"modelName" : "string",
"inverterSeriesOther" : "boolean",
"inverterSeries" : "string",
"inverterStandard" : "string",
"inverterDeviceCapacity" : "number",
"sustainOpOvervoltLimit" : "number",
"stopAtOverFreq" : "number",
"stopAtUnderFreq" : "number",
"invVoltWattRespMode" : "string",
"invWattRespV1" : "number",
"invWattRespV2" : "number",
"invWattRespV3" : "number",
"invWattRespV4" : "number",
"invWattRespPAtV1" : "number",
"invWattRespPAtV2" : "number",
"invWattRespPAtV3" : "number",
"invWattRespPAtV4" : "number",
"invVoltVarRespMode" : "string",
"invVarRespV1" : "number",
"invVarRespV2" : "number",
"invVarRespV3" : "number",
"invVarRespV4" : "number",
"invVarRespQAtV1" : "number",
"invVarRespQAtV2" : "number",
"invVarRespQAtV3" : "number",
"invVarRespQAtV4" : "number",
"invReactivePowerMode" : "string",
"invFixReactivePower" : "number",
"fixPowerFactorMode" : "string",
"fixPowerFactor" : "number",
"fixPowerFactorQuad" : "string",
"powerRespMode" : "string",
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"referencePointP2" : "number",
"powerFactorAtP1" : "number",
"powerFactorQuadAtP1" : "string",
"powerFactorAtP2" : "number",
"powerFactorQuadAtP2" : "string",
"powerRateLimitMode" : "string",
"powerRampRate" : "number",
"reactivePowerRegulation" : "string",
"voltageSetPoint" : "number",
"voltageSetPointUnit" : "string",
"deadband" : "number",
"droop" : "number",
"baseForDroop" : "number",
"reactivePowerSourceLimit" : "number",

```

```

"reactivePowerSinkLimit" : "number",
"reactiveFixPowerFactor" : "number",
"reactiveFixPowerFactorQuad" : "string",
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  "recordCommissioningDate" : "string",
  "recordUpdateDate" : "string",
  "recordConfirmedDate" : "string",
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  "type" : "string",
  "subType" : "string",
  "count" : "number",
  "status" : "string",
  "installationStage" : "string",
  "details" :
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    "subTypeOther" : "boolean",
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    "manufacturerName" : "string",
    "modelOther" : "boolean",
    "modelName" : "string",
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    "nominalStorageCapacity" : "number"
  }
}
]
},
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{
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  "details" : "string",
  "status" : "string",
  "deviceId" : "number",
  "connectionId" : "number",
  "nspAcknowledged" : "string"
}
]
}

```

Item	Value
	<pre>] }, "warnings": [{ "code": "string", "title": "string", "detail": "string", "source": "string" }] } </pre>

Field	Applies When	Type	Description	Comments
nmi	N/A	string(10)	Unique identifier for each connection point where DER installation has been installed/approved	
jobNumber	N/A	string(30)	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works	This identifier is specified by the NSP as per their connection process. This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
recordUpdateDate	N/A	string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Record was updated.	AEMO will store a history of all versions changes and it can be tracked via this date. A new version is generated every time a new submission or update happens

Field	Applies When	Type	Description	Comments
approvedCapacity	N/A	number(8,3)	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Can be distinct or equal to an export limitation. Permitted range is between 0 and 30,000
availablePhasesCount	N/A	number(1)	The number of phases available for the installation of DER.	Permitted value is one of the following: - 1 - 2 - 3
installedPhasesCount	N/A	number(1)	The number of phases that DER is connected to.	Permitted value is one of the following: - 1 - 2 - 3
islandableInstallation	N/A	string(3)	For identification of small generating units designed with the ability to operate in an islanded mode.	Permitted value is one of the following: - Yes - No
centralProtectionControl	See 3.9.2, page 170.	string(3)	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Used to describe the type(s) of central protection to be applied to the DER system. Permitted value is one of the following: - Yes - No
exportLimitkva	See 3.9.2, page 170.	number(8,3)	Export limit (kVA) Maximum amount of power (kVA) that may be exported from a connection point to the grid, as monitored by a control / relay function. A null value indicates no limit. Permitted range is between 0 and 30,000	

Field	Applies When	Type	Description	Comments
underFrequencyProtection	See 3.9.2, page 170.	number(4,2)	Under frequency protection in Hz Permitted range is between 45 and 50 (inclusive)	Described in AS4777.1:2016 Table 2.
underFrequencyProtectionDelay	See 3.9.2, page 170.	number(4,3)	Under frequency protection delay in seconds	
overFrequencyProtection	See 3.9.2, page 170.	number(4,2)	Over frequency protection in Hz Permitted range is between 50 and 55 (inclusive)	Described in AS4777.1:2016 Table 2.
overFrequencyProtectionDelay	See 3.9.2, page 170.	number(4,3)	Over frequency protection delay in seconds	
underVoltageProtection	See 3.9.2, page 170.	number(9,3)	Under voltage protection in volts (V)	Described in AS4777.1:2016 Table 2.
underVoltageProtectionDelay	See 3.9.2, page 170.	number(4,3)	Under voltage protection delay in seconds	
overVoltageProtection	See 3.9.2, page 170.	number(9,3)	Over voltage protection in volts (V)	Described in AS4777.1:2016 Table 2.
overVoltageProtectionDelay	See 3.9.2, page 170.	number(4,3)	Over voltage protection delay in seconds	
sustainedOverVoltage	See 3.9.2, page 170.	number(9,3)	Sustained Over voltage protection in volts (V)	Described in AS4777.1:2016 Table 2.
sustainedOverVoltageDelay	See 3.9.2, page 170.	number(5,3)	Sustained Over Voltage protection delay in seconds. Permitted range is between 10 and 20 (inclusive).	

Field	Applies When	Type	Description	Comments
frequencyRateOfChange	See 3.9.2, page 170.	number(4,3)	Rate of change of frequency trip point (Hz/s). Permitted range is between 0 and 4 (inclusive)	
voltageVectorShift	See 3.9.2, page 170.	number(4,2)	Trip angle (Deg)	
interTripScheme	See 3.9.2, page 170.	string(100)	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement	See 3.9.2, page 170.	number(7,3)	Trip voltage (V)	
installerId		string(50)	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).
submitterId		string(50)	Records the userid that submitted this record	This is system generated by AEMO.
submitterClass		string(9)	Records the user classification whether it is NSP or others	Would be either "NSP" or "Installer"
submitMode		Varchar(6)		This attribute is NOT applicable to NSPs. It is to be used by Account-holders. Any submitted value by NSP shall be rejected. Permitted values is one of the following: - Save - Submit

Field	Applies When	Type	Description	Comments
accessRequested		Boolean		
comments		string(2000)	Comments to help with DER Submission.	This field shall help NSPs to write notes that help with the "Connection Process". These comments for NSP internal use only.
acConnections				
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	This is system generated by AEMO.
nspConnectionId		string(50)	An AC Connection identifier that is used by NSP internally	This is provided to assist participants with linking their internal ID with AEMO's generated connectionId
recordCreationDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record was created.	System generated and it is the date that the AC Connection gets submitted for the first time
recordConfirmedDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record becomes "Confirmed" for the first time	System generated. This date in combination with AC Connection commissioning date are needed to monitor / manage obligation on timeframe to complete submission of record.

Field	Applies When	Type	Description	Comments
recordEndDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record ends or becomes decommissioned	System generated If DER Record is "Initial" or "Idle" and it is removed, this date will capture the removal date. If DER Record is "Conditional" or "Confirmed" and it is decommissioned, this date will capture the decommissioning date.
commissioningDate		string (YYYY-MM-DD)	The date that an AC Connection becomes "Active"	This date and AC Connection RecordConfirmedDate are needed to monitor / manage obligation on timeframe to complete submission of AC Connection. Commissioning date can be in the past, present or the future
installationStage		string(11)	Installation stage of the AC connection. This will be used to indicate to the user if the AC Connection is initial, conditional, confirmed, or idle. See 2.8, Installation stage.	Permitted value to be returned is one of the following: - Initial - Conditional - Confirmed - Idle
equipmentType		string(20)	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted value is one of the following: - Inverter - Other

Field	Applies When	Type	Description	Comments
cecConnectionId		string(30)	Unique device identifier to store CEC inverter reference data	This ID shall be returned if the submitted inverter is accredited
count		number(5)	Number of AC Connections in the group. For the suite of AC Connections to be considered as a group , all the AC Connections included must have the same attributes.	
statusCode		string(20)	<p>Code used to indicate the status of the AC Connection. This will be used to identify if an AC Connection is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • Inactive • Active • Decommissioned 	<p>This status is only applicable on AC Connections. This is not a duplicate of the NMI level status, as inverters may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an AC Connection record that is created but that AC Connection is NOT physically installed or operating yet.</p> <p>Active: an AC Connection record that is physically installed and operating</p> <p>Decommissioned: an AC Connection that used to operate, and it is NOT operating any more.</p>
frequencyRateOfChange		number(4,3)	<p>Rate of change of frequency (Hz/s)</p> <p>Permitted value is between 0 and 4 (inclusive)</p>	

Field	Applies When	Type	Description	Comments
voltageVectorShift		number(4,2)	Trip angle (Deg.)	
interTripScheme		string(100)	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement		number(7,3)	Trip voltage (V)	
dredInverterInteraction	If equipmentType = inverter	string(3)		Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
serialNumbers		string(array)	The serial number of the device(s)	<p>If the equipment type = Inverter, the number of Serial Numbers (where entered) required must match the number of AC Connections.</p> <p>For example, if "count" = 3, then "serialNumbers" (where entered) must = 3.</p> <ul style="list-style-type: none"> - For NSP APIs, "serialNumbers" can be NULL. - For Account-holder APIs, "serialNumbers" must be entered and the above rule applies or the API will return an Exception 1021. <p>The maximum number of serial numbers permissible is 999.</p>

Field	Applies When	Type	Description	Comments
manufacturerOther		boolean	This is used to indicate if a manufacturer is accredited	Permitted value is one of the following: - true - false
manufacturerName	If equipmentType = inverter	string(120)	The name of the inverter manufacturer	Using DER Web, a list of accredited manufactures will be listed. If selected value = Other, the user needs to specify
modelOther		boolean	This is used to indicate if a model number is accredited	Permitted value is one of the following: - true - false
modelName		string(120)	The model number of the inverter.	Using DER Web, a list of accredited model numbers will be listed. If selected value = Other, the user needs to specify
inverterSeriesOther		boolean	This is used to indicate if an inverter series is accredited	Permitted value is one of the following: - true - false
inverterSeries		string(50)	The inverter series.	Using DER Web, a list of accredited model numbers will be listed. If selected value = Other, the user needs to specify

Field	Applies When	Type	Description	Comments
inverterStandard		string(100)	<p>What standard/s is the inverter manufactured, tested and installed to?</p> <p>Examples include AS4777.2:2015, IEC 62109-1 and IEC 62019-2.</p>	<p>Using DER web, if the selected "modelName" is accredited, this value will be auto-populated.</p> <p>If "modelName" is equal to "Other" This value will be entered manually</p> <p>The auto-populated value is obtained from reference data</p>
inverterDeviceCapacity		number(9,3)	<p>The rated AC output power that is listed in the product specified by the manufacturer.</p> <p>This value refers to a single device.</p>	<p>Using DER web, if the selected "modelName" is accredited, this value will be auto-populated.</p> <p>If "modelName" is equal to "Other" This value will be entered manually</p> <p>The auto-populated value is obtained from reference data</p>
sustainOpOvervolt Limit		number(7,3)	<p>Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the $V_{nom-max}$.</p> <p>The unit is in (V)</p>	<p>Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p>
stopAtOverFreq		number(4,2)	<p>Frequency (stop) In Hz</p> <p>Permitted range is between 51 and 52 (inclusive)</p>	

Field	Applies When	Type	Description	Comments
stopAtUnderFreq		number(4,2)	Frequency (stop) In Hz Permitted range is between 47 and 49 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them
invVoltWattRespMode	If equipmentType = inverter	string(15)	Permitted Value is one of the following: Permitted Value is one of the following: Enabled Not Enabled	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API
invWattRespV1	If invVoltWattRespMode = Enabled	number(7,3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them This mode is described in AS4777.2:2015, section 6.3.2.1.
invWattRespV2		number(7,3)	Unit is in (V) Permitted range is between 216 and 230 (inclusive)	
invWattRespV3		number(7,3)	Permitted range is between 235 and 255 (inclusive)	
invWattRespV4		number(7,3)	Unit is in (V) Permitted range is between 244 and 265 (inclusive)	
invWattRespPAV1		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAV2		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAV3		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	

Field	Applies When	Type	Description	Comments
invWattRespPAtV4		number(6,3)	Unit is in (%) Permitted range is between 0 and 20 (inclusive)	
invVoltVarRespMode	If equipmentType = inverter	string(15)	Permitted Value is one of the following: Enabled Not Enabled	
invVarRespV1	If invVoltVarRespMode = Enabled	number(7,3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	
invVarRespV2		number(7,3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	
invVarRespV3		number(7,3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	
invVarRespV4		number(7,3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	
invVarRespQAtV1		number(6,3)	Unit is in (%) Permitted range is between 0 and 60 (inclusive)	
invVarRespQAtV2		number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	

Field	Applies When	Type	Description	Comments
invVarRespQAtV3		number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	
invVarRespQAtV4		number(6,3)	Unit is in (%) Permitted range is between -60 and 0 (inclusive) -ve sign refers to "sink".	
invReactivePower Mode	If equipmentType = inverter	string(15)	Select which power quality response modes are enabled on the inverter. Permitted Value is one of the following: <ul style="list-style-type: none"> Enabled Not Enabled It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.	
invFixReactivePower	If invReactivePowerMode = Enabled	number(6,3)	Reactive Power. Specified in % output of the system. Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range Auto-populated values are based on

Field	Applies When	Type	Description	Comments
fixPowerFactorMode	If equipmentType = inverter	string(15)	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> Enabled Not Enabled <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	<p>preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API , the user shall manually provide them</p>
fixPowerFactor	If fixPowerFactorMode = Enabled	number(4,3)	Permitted range is between 0.8 and 1 (inclusive)	
fixPowerFactorQuad		string(10)	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> Source Sink 	
powerRespMode	If equipmentType = inverter	string(15)	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> Enabled Not Enabled <p>It should = "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	
referencePointP1	If powerResp	number(6,3)	Unit is in (%)	Using DER Web, these values will be auto-populated
referencePointP2		number(6,3)	Unit is in (%)	

Field	Applies When	Type	Description	Comments
powerFactorAtP1	Mode = Enabled	number(4,3)	Permitted range is between 0.9 and 1 (inclusive)	based on "Inverter Device Capacity" range
powerFactorQuadAtP1		string(10)	Permitted Value is one of the following: Source Sink	Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API
powerFactorAtP2		number(4,3)	Permitted range is between 0.9 and 1 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them
powerFactorQuadAtP2		string(10)	Permitted Value is one of the following: <ul style="list-style-type: none"> • Source • Sink 	The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installation.

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Field	Applies When	Type	Description	Comments
powerRateLimitMode	If equipmentType = inverter	string(15)	Select which power quality response modes are enabled on the inverter.	<p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API , the user shall manually provide them</p> <p>This mode is described in AS4777.2:2015, section 6.3.5.3.3.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled

Field	Applies When	Type	Description	Comments
powerRampRate	If powerRateLimitMode = Enabled	number(6,3)	Unit is W _{Gra} . The power rate limit range shall be adjustable in the range of 5 - 100 of rated power per minute	Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values provided in submitPreferences API, the user shall manually provide them As described in AS4777.2:2015, section 6.3.5.1.
reactivePowerRegulation	If equipmentType = inverter	string(20)		Permitted Value is one of the following: <ul style="list-style-type: none"> • None • Voltage droop • Fixed power factor
voltageSetPoint	If reactivePowerRegulation = Voltage droop	number(9,3)	The set voltage point	Permitted Value is one of the following: <ul style="list-style-type: none"> • % • V
voltageSetPointUnit		string(1)	The unit for voltageSetPoint	
deadband		number(6,3)	± x%	
droop		number(5,3)	In %	
baseForDroop		number(8,3)	In kVA	
reactivePowerSourceLimit		number(8,3)	In Var	

Field	Applies When	Type	Description	Comments
reactivePowerSinkLimit		number(8,3)	In Var	
reactiveFixPowerFactor	If reactivePowerRegulation = Fixed	number(4,3)		Permitted range is between 0 and 1 (inclusive)
reactiveFixPowerFactorQuad	power factor	string(10)		Permitted Value is one of the following: <ul style="list-style-type: none"> • Source • Sink
generatorRampRate	If equipmentType = inverter	string(15)		A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled
powerRampGradient	If generatorRampRate = Enabled	number(6,3)	Power ramp rate (%/min)	Permitted range is between 0 and 100 (inclusive)
frequencySensitiveMode	If equipmentType = inverter	string(15)		A generator may operate in a frequency sensitive mode whereby it adjusts output to help support frequency control. A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled
frequencyDeadband	If frequencySensitiveMode = Enabled	number(6,3)	In Hz	
frequencyDroop		number(4,2)	In %	

Field	Applies When	Type	Description	Comments
devices				
deviceId		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO. Permitted value is either:</p> <ul style="list-style-type: none"> • Null; or • an existing deviceId that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceId is none of the above.</p> <p>Null shall be used in the event of adding a new record</p> <p>Existing deviceId will be used for updating an existing record</p>
nspDeviceId		string(50)	A DER Device identifier that is used by NSP internally	This is provided to assist participants with linking their internal ID with AEMO's generated deviceId
recordCreationDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record was created.	

Field	Applies When	Type	Description	Comments
recordCommissioningDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record became active.	This will either equal to: Commissioning date of the AC Connection linked to it, if they were created on the same date; OTHERWISE The date that the DER Device status becomes "Active" recordCommissioningDate can be in the past, or present
recordConfirmedDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record became "Confirmed" for the first time	System generated. This date in combination with Device recordCommissioningDate are needed to monitor / manage obligation on timeframe to complete submission of record.
recordEndDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record ends/decommissioned	System generated If DER Record is "Initial" or "Idle" and it is removed, this date will capture the removal date. If DER Record is "Conditional" or "Confirmed" and it is decommissioned, this date will capture the decommissioning date.
cecDeviceId		string(30)	Unique device identifier to store CEC Device reference data	This ID shall be returned if the submitted device is accredited

Field	Applies When	Type	Description	Comments
type		string(50)	Used to indicate the primary technology used in the DER device.	<p>Expected Value is one of the following:</p> <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other <p>"Other" is only applicable in the web portal. Selecting "Other" will request the user to specify.</p> <p>Using API, it is accepted to submit a device type that is not in the list. There is no validation applied on this.</p>

subType		string(50)	Used to indicate the primary technology used in the DER device.	<p>This field is also used to record for example the battery chemistry, or the type of PV panel. It is also used to record if a battery is contained in an electric vehicle connected in a vehicle-to-grid arrangement.</p> <p>If Type = Solar PV, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Monocrystalline - Polycrystalline - Crystalline - Thin-film - Concentrating PV - Silicon - Biohybrid - Cadmium telluride - Other <p>If Type = Storage, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Lithium-ion - Lead acid - Lead carbon - Sodium nickel - Lead crystal - Absorbed glass matt - Vanadium - Aqueous hybrid ion - Tubular gel - Zinc bromide - Electric Vehicle - Other <p>If Type != Solar PV or Storage, the permitted value is "Other"</p> <p>"Other" is only applicable in the web portal. Selecting "Other" will request the user to specify</p> <p>Using API, it is accepted to submit a device sub-type that is not in the list. There is no</p>
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Field	Applies When	Type	Description	Comments
				validation applied on this.
count		number(5)	Number of devices in the group of DER devices.	
status		string(20)	<p>Code used to indicate the status of the DER Device. This will be used to identify if a Device is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • Inactive • Active • Decommissioned 	<p>This status is only applicable on DER Device. This is not a duplicate of the NMI level status, as Devices may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an DER Device record that is created but that DER Device is NOT physically installed or operating yet.</p> <p>Active: an DER Device record that is physically installed and operating</p> <p>Decommissioned: an DER Device that used to operate, and it is NOT operating any more.</p>
installationStage		string(11)	<p>Installation stage of the DER Device.</p> <p>This will be used to indicate to the user if the DER Device is initial, conditional, confirmed, or idle.</p> <p>See 2.8, Installation stage.</p>	<p>Permitted value to be returned is one of the following:</p> <ul style="list-style-type: none"> - Initial - Conditional - Confirmed - Idle

Field	Applies When	Type	Description	Comments
typeOther	If type = Other	boolean	To indicate if the submitted device type is part of the provided list	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> - true - false <p>If the submitted device "type" is one of the list provided below, the returned value shall be false</p> <p>If the submitted device "type" is NOT one of the list provided below, the returned value shall be false</p>
subTypeOther	If subType = Other	boolean	To indicate if the submitted device subtype is part of the provided list	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • true • false <p>If the submitted device "subType" is one of the list provided below, the returned value shall be false</p> <p>If the submitted device "subType" is NOT one of the list provided below, the returned value shall be true</p>
manufacturerOther		boolean	This is used to indicate if a manufacturer is accredited	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • true • false
manufacturerName		string(120)	The name of the device manufacturer	Definitions align to the approved modules list.
modelOther		boolean	This is used to indicate if a model number is accredited	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • true • false
modelName		string(120)	The model number of the device.	Definitions align to the approved modules list.

Field	Applies When	Type	Description	Comments
nominalRatedCapacity		number(8,3)	Maximum output in kVA that is listed in the product specification by the manufacturer. This refers to the capacity of each unit within the device group.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually The auto-populated value is obtained from reference data
nominalStorageCapacity	If Type = Storage	number(9,3)	Maximum storage capacity in kWh. This refers to the capacity of each storage module within the device group.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually The auto-populated value is obtained from reference data
exceptions				
exceptionId		number	A unique identification for an exception generated when business validation fails	This Id is integer value and will be generated by AEMO upon a submission that fails business validation Permitted value of submission is one of the following: an existing exceptionId that was previously generated by AEMO Null If the ExceptionId was not generated by AEMO, the system will reject the submission.
code		number(4)	Code used to indicate the type of exception	

3. NSP APIs, 3.6 POST getDER 3.6.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
name		string(20)	Name of exception	
affectedAttributes		string(300)	Lists the names of fields that were the reason for producing this exception	
details		string(200)	Description of the exception	
status		string(6)	Status of exception (Open or closed)	Permitted values is one of the following: <ul style="list-style-type: none"> • Open • Closed
deviceId		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO.</p> <p>Permitted value is either:</p> <ul style="list-style-type: none"> • Null; or • an existing deviceId that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceId is none of the above.</p> <p>Null shall be used in the event of adding a new record</p> <p>Existing deviceId will be used for updating an existing record</p>

Field	Applies When	Type	Description	Comments
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	<p>This is system generated by AEMO.</p> <p>Permitted value is either:</p> <ul style="list-style-type: none"> • Null; or • an existing connectionId that has been previously generated by AEMO <p>AEMO's system will reject submission if connectionId is none of the above.</p> <p>Null shall be used in the event of adding a new record</p> <p>Existing connectionId will be used for updating an existing record</p>
nspAcknowledged		string(3)	<p>This is used when there is an exception but the user acknowledges it without resolving/editing the exception.</p> <p>For example, if model number is not accredited, AEMO will generate an exception. The user will have the ability to acknowledge it and exception will be closed.</p>	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> - Yes - No <p>Yes indicates that the user acknowledged the exception and record will become "Confirmed" (provided no other exceptions).</p> <p>No will do nothing to the exception and it will stay open.</p>

3.7 POST grantJobAccess

3.7.1 Description

This API is used by participants to grant/block job access to Account-holders.

3.7.2 Request

Item	Value
URL Path	/grantJobAccess
Method	POST
Header	<p>Standard request header attributes, be sure to include:</p> <p>Authorization: Basic</p> <p>Content-Encoding: Should be one of [gzip, deflate, compress]</p> <p>Accept-Encoding: Should be one or more of [gzip, deflate, compress]</p>
Body	<pre>{ "data" : { "nmi" : "string", "jobNumber" : "string", "accessGranted" : "Boolean" }, "required": ["nmi", "jobNumber", "accessGranted"] }</pre>

Field	Type	Option	Description	Comments
nmi	string(10)	M	Unique identifier for each connection point where DER installation has been installed/approved	
jobNumber	string(30)	M	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	<p>This identifier is specified by the NSP as per their connection process.</p> <p>This number is used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.</p>

Field	Type	Option	Description	Comments
accessGranted	Boolean	M	To grant or block an Account-holder from accessing a job number	<p>Permitted values are true, or false.</p> <p>true allows Account-holders to use a job number to access a DER Record within 365 days.</p> <p>DER Record access via a job number shall last for 365 days for the date of submission of that job number OR until a receipt is generated for that job number.</p> <p>If any of these conditions meets, DER Access via this job number shall be blocked.</p> <p>false prevents Account-holders from accessing a DER Record using that job number.</p>

3.7.3 Valid Submission Response

Item	Value
Response Code	200
Header	<p>Standard response header attributes:</p> <p>Content-Type: application/json</p> <p>Content-Encoding: As requested [gzip, compress, deflate]</p>
Body	<pre>{ "transactionId" : "string", "data" : }</pre>
Example	<pre>{ "transactionId": "4dfa3ca1-6cd7-4067-b526-f9989866b305", "data": null }</pre>

3.8 POST getReceipts

3.8.1 Description

This API is used by participants to get a list of all receipts associated with single or multiple DER Records based on the supplied filter(s). The returned file size is to be confirmed.

3.8.2 Request

Item	Value
URL Path	/getReceipts
Method	POST
Header	Standard request header attributes, be sure to include: Authorization: Basic Content-Encoding: Should be one of [gzip, deflate, compress] Accept-Encoding: Should be one or more of [gzip, deflate, compress]
Body	<pre>{ "data" : { "modifiedDateFrom" : "string", "modifiedDateTo" : "string", "jobReferences" : [{ "nmi" : "string", "jobNumber" : "string", "installerId" : "string", "required": ["nmi", "jobNumber"] }] } }</pre>

Field	Type	Option	Description	Comments
modifiedDateFrom	string (YYYY-MM-DDTHH:mm:ss.sssZ)	O	From update date for a DER Record	This is not applicable to account holders. Only NSPs can use this

modifiedDateTo	string (YYYY-MM-DDTHH:mm:ss.sssZ)	O	To update date for a DER Record	This is not applicable to account holders. Only NSPs can use this
jobReferences				
nmi	string(10)	M	Unique identifier for each connection point where DER installation has been installed/approved	
jobNumber	string(30)	M	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	Specified by the NSP. This number will be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
installerId	string(50)	M	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).

3.8.3 Valid Submission Response

Item	Value
Response Code	200
Header	Standard response header attributes: Content-Type: application/json Content-Encoding: As requested [gzip, compress, deflate]

Body

```
{
  "transactionId" : "string",
  "data" :
  {
    "receipts" :
    [
      {
        "nmi" : "string",
        "jobNumber" : "string",
        "disclaimer" : "string",
        "derJobCompleteDate" : "string",
        "installerId" : "string",
        "approvedCapacity": "number",
        "confirmationLengthTime" : "number",
        "centralProtectionControl" : "string",
        "acConnections" :
        [
          {
            "connectionId" : "number",
            "equipmentType" : "string",
            "installedCapacity": "number",
            "manufacturerName" : "string",
            "modelName" : "string"
          }
        ],
        "devices" :
        [
          {
            "deviceId" : "number",
            "type" : "string",
            "installedCapacity": "number",
            "manufacturerName" : "string",
            "modelName" : "string"
          }
        ]
      }
    ],
    "warnings":
    [
      {
        "code": "string",
        "title": "string",
        "detail": "string",
        "source": "string"
      }
    ]
  }
}
```

3. NSP APIs, 3.8 POST getReceipts 3.8.3 Valid Submission Response

Field	Applies When	Type	Description	Comments
nmi		string(10)	Unique identifier for each connection point where DER installation has been installed/approved	
jobNumber		string(30)	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	This identifier is specified by the NSP as per their connection process. This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
disclaimer		string	Standard disclaimer information provided to Account-holders after submitting DER record details.	Only returned to Account-holders. For NSPs, this is returned as null.
derJobComplete Date		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when all AC Connections and DER Devices for a certain job become "Confirmed". It is the date that receipt is generated.	System generated value. Format in (YYYY-MM-DDTHH:mm:ss.sssZ)
installerId		string(50)	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).

approvedCapacity		number(8,3)	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Can be distinct or equal to an export limitation. Permitted range is between 0 and 30,000.
confirmationLengthTime		number(6,3)	The time of how long it took a job to be confirmed since records were active	The number of business days between derJobCompleteDate and the last commissioningDate/recordCommissioningDate for a DER Record during a certain job.
centralProtectionControl		string(3)	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Used to describe the type(s) of central protection to be applied to the DER system. Permitted value is one of the following: Yes No
acConnections				
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	This is system generated by AEMO.
equipmentType		string(20)	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted value is one of the following: Inverter Other
installedCapacity	If EquipmentType = Inverter	number(8,3)	The total capacity of inverter that are installed during a certain job	It is a calculated value. It represents what is the total inverter capacity that is physically installed at site for a certain job number
manufacturerName				Only returned to account-holders. For NSPs, this is returned as null
modelName				Only returned to account-holders. For NSPs, this is returned as null

devices				
deviceId	number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO.</p> <p>Permitted value is either:</p> <ul style="list-style-type: none"> - Null; or - an existing deviceId that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceId is none of the above.</p> <p>Null shall be used in the event of adding a new record</p> <p>Existing deviceId will be used for updating an existing record</p>	
type	string(50)	Used to indicate the primary technology used in the DER device.	<p>Expected Value is one of the following:</p> <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other <p>Other values might be returned depends on the submitted Device "type".</p>	
installedCapacity	number(8,3)	The total capacity of DER Devices installed during a job	It is a calculated value. It represents what is the total device capacity that is physically installed at site for a certain job number.	
manufacturerName			Only returned to account-holders. For NSPs, this is returned as null	
modelName			Only returned to account-holders. For NSPs, this is returned as null	

3.9 Validation Rules

3.9.1 First Validation: DER Pre-Submission

Business Rules	Impacted Field(s)-	Applies to	Exception Code
Job number must be unique for an NMI and for the NSP that sent it. Job number must not have been submitted before for a different NMI by the same NSP.	Jobnumber	NSP	1000
NMI must exist in MSATS	nmi	NSP	1010
NMI must not be extinct	nmi	NSP	1011
NSP currently holds the LNSP role for this NMI	nmi	NSP	1012
Content must be in the correct format	All	Account-holder and NSP	1020
All mandatory fields are completed	Mandatory Fields	Account-holder and NSP	1021
NMI must have at least one AC Connection linked to it.	N/A	Account-holder and NSP	1030
Each AC Connection with status of null, Active or Inactive must have at least one Device linked to it	N/A	Account-holder and NSP	1031
Each Device with status of null, Active or Inactive must have an AC Connection linked to it	N/A	Account-holder and NSP	1032
If there is an existing Confirmed AC Connection or DER Device and status = Active, it must be included in every submission, i.e. Confirmed AC Connections or DER Devices cannot be removed If Confirmed DER Record is decommissioned, status changes to Decommissioned and must be submitted.	N/A	Account-holder and NSP	1040

Business Rules	Impacted Field(s)-	Applies to	Exception Code
If there is an existing Confirmed AC Connection or DER Device and status = Active, it must be included in every submission, i.e. Conditional DER Records cannot be removed If Conditional DER Record is decommissioned, status changes to Decommissioned and must be submitted	N/A	Account-holder and NSP	1041
AC Connection ID must be null or generated previously by AEMO.	connectionId	Account-holder and NSP	1050
DER Device ID must be null or generated previously by AEMO.	deviceId	Account-holder and NSP	1051
AC Connection status must be null or Inactive if commissioning date is null or in the future	AC Connection statusCode	Account-holder and NSP	1060
AC Connection status must be Active or Decommissioned if commissioning date is in the present or in the past	AC Connection statusCode	Account-holder and NSP	1061
Device Status must be null or Inactive if the AC Connection linked to it has status of null or Inactive .	Device status	Account-holder and NSP	1062
Device Status must be Decommissioned if the AC Connection linked to it has status of Decommissioned	Device Status	Account-holder and NSP	1063
AC Connection status cannot be Inactive if it was previously Active or Decommissioned	AC Connection statusCode	Account-holder and NSP	1064
DER Device status must NOT be Inactive if it was previously Active or Decommissioned	Device status	Account-holder and NSP	1065
Number values must be within the permitted range. These ranges are specified in the tables in Section 7.	number fields	Account-holder and NSP	1070

Business Rules	Impacted Field(s)-	Applies to	Exception Code
Device Type must be Solar, Storage, or Wind if the AC Connection linked to it = Inverter	type	Account-holder and NSP	1080
Device Type must be NOT Solar, Storage, or Wind if the AC Connection linked to it = Other	type	Account-holder and NSP	1081
The count of submitted Serial numbers for an AC Connection must equal the number of AC Connections	serialNumbers	Account-holder and NSP	1090
<p>Each ACTIVE AC Connection must have "number of AC Connection" equal to or less than total of Total of "number of DER Devices" that are linked to it, i.e.</p> $\text{number of AC Connections} \leq \text{SUM} \{ \text{number of Devices 1} + \text{number of Devices 2} \dots + \text{number of Devices n} \}$ <p>Where n is the number of Devices or group of DER Devices connected to that AC Connection</p> <p>This validation is only applicable if AC Equipment Type = Inverter</p>	AC Connection count	Account-holder and NSP	1110
If AC Equipment Type = Other, then "number of AC Connection" must equal to "number of DER Devices" linked to it	AC Connection count	Account-holder and NSP	1111

Business Rules	Impacted Field(s)-	Applies to	Exception Code
One of Protection and Control Modes attributes must be submitted	The following Level 1 (NMI Level) fields: exportLimitkva underFrequencyProtection underFrequencyProtectionDelay overFrequencyProtection overFrequencyProtectionDelay underVoltageProtection underVoltageProtectionDelay overVoltageProtection overVoltageProtectionDelay sustainedOverVoltage sustainedOverVoltageDelay frequencyRateOfChange voltageVectorShift interTripScheme neutralVoltageDisplacement	Account-holder and NSP	1120
Reactive power mode MUST be "Not Enabled" if any of Voltage response modes are Enabled	invReactivePowerMode	Account-holder and NSP	1121
Fixed power factor mode MUST be "Not Enabled" if any of Voltage response modes are Enabled	fixPowerFactorMode	Account-holder and NSP	1122
Power factor curve / power response mode MUST be "Not Enabled" if any of Voltage response modes are Enabled	powerRespMode	Account-holder and NSP	1123
If export limit is specified, it must be equal or smaller than approved capacity	exportLimitkva	Account-holder and NSP	1130
If "Voltage set point unit" is %, then "Voltage set point" must NOT be more than 100	voltageSetPoint	Account-holder and NSP	1140
Inverter default settings ranges must NOT overlap	minimumCapacity maximumCapacity	NSP	1160
Inverter default NSP approval ranges must NOT overlap	minApprovedCapacity maxApprovedCapacity	NSP	1161

3.9.2 Second Validation: DER Pre-Submission

Business Rules	Impacted Field(s)-	Applies to	Exception Code	Comments
Manufacturer must be accredited	Inverter manufacturerName	Account-holder and NSP	2000	NSPs can acknowledge any exceptions generated by any of these business rules. Acknowledging these exceptions will change the "installationStage" the AC Connection or DER Device related to it to become "Confirmed". Refer to "DER Process Update"
Inverter Model number must be accredited	Inverter modelNumber	Account-holder and NSP	2001	
Inverter Series must be accredited	inverterSeries	Account-holder and NSP	2002	
Device Manufacturer must be accredited	Device manufacturerName	Account-holder and NSP	2003	
Device Model number must be accredited	Device modelNumber	Account-holder and NSP	2004	
Accredited inverter commissioning date must be within the accredited approved period	AC Connection commissioningDate	Account-holder and NSP	2010	
Accredited device commissioning date must be within the accredited approved period	Device commissioningDate	Account-holder and NSP	2011	
NSP must be notified if optional fields are not submitted by Account-holders	Optional Attributes	NSP and Account-holder	2023	NSPs cannot acknowledge this exception.

Inverter must have the capabilities to support the inverter settings data., i.e. if the user has entered inverter settings data for inverter capabilities, but the inverter entered does not have the capabilities that support it, the system will raise an exception.	invVoltWattRespMode invVoltVarRespMode invReactivePowerMode fixPowerFactorMode, powerRespMode powerRateLimitMode	Account-holder and NSP	2030	NSPs cannot acknowledge this exception. Exception will be resolved if the selected mode that resulted exception becomes "Not Enabled"
If no export limit is specified, approved capacity must be equal or bigger than AC Connection installed Capacity	approvedCapacity	Account-holder and NSP	2040	AC Connection Installed capacity is a calculated value. It represents what is the total capacity physically installed at site. Exceptions generated due to this validation rule cannot be acknowledged. All AC Connections and DER Devices that were newly added will be "Conditional". Refer to "DER Process Update"
For accredited inverters, "Inverter device capacity" must be aligned with the submitted model number. Reference data shall be used for validating this alignment	inverterDeviceCapacity	Account-holder and NSP	2050	These exceptions cannot be acknowledged.

Several fields depend on the Central Protection and Control field	<p>centralProtectionControl, exportLimitkva, frequencyRateOfChange, interTripScheme, neutralVoltageDisplacement, overFrequencyProtection, overFrequencyProtectionDelay, overVoltageProtection, overVoltageProtection1, overVoltageProtection1Delay, overVoltageProtection2, overVoltageProtectionDelay, sustainedOverVoltage, sustainedOverVoltageDelay, underFrequencyProtection, underFrequencyProtectionDelay, underVoltageProtection, underVoltageProtectionDelay, voltageVectorShift</p>	<p>If 'centralProtectionControl' = yes, you must supply at least one of the other listed fields. If none of these fields are supplied, DER Register will reject the submission.</p> <p>If centralProtectionControl = no, these fields are not applicable and DER Register will ignore any submitted value for these fields.</p>
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The following second stage validations will be reconsidered later (Date to be confirmed)

Business Rules	Impacted Field(s)-	Applies To	Exception Code	Comments
Manufacturer must be accredited	Inverter manufacturerName	Account-holder and NSP	2000	NSPs can acknowledge any exceptions generated by any of these business rules. Acknowledging these exceptions will change the "installationStage" the AC Connection or DER Device related to it to become "Confirmed". Refer to "DER Process Update"
Inverter Model number must be accredited	Inverter modelNumber	Account-holder and NSP	2001	
Inverter Series must be accredited	inverterSeries	Account-holder and NSP	2002	
Device Manufacturer must be accredited	Device manufacturerName	Account-holder and NSP	2003	
Device Model number must be accredited	Device modelNumber	Account-holder and NSP	2004	
Accredited inverter commissioning date must be within the accredited approved period	AC Connection commissioningDate	Account-holder and NSP	2010	
Accredited device commissioning date must be within the accredited approved period	Device commissioningDate	Account-holder and NSP	2011	

Inverter must have the capabilities to support the inverter settings data., i.e. if the user has entered inverter settings data for inverter capabilities, but the inverter entered does not have the capabilities that support it, the system will raise an exception.	"invVoltWattRespMode" "invVoltVarRespMode" , "invReactivePowerMode" , "fixPowerFactorMode" , "powerRespMode" , "powerRateLimitMode"	Account- holder and NSP	2030	NSPs cannot acknowledge this exception. Exception will be resolved if the selected mode that resulted exception becomes "Not Enabled"
For accredited inverters, "Inverter device capacity" must be aligned with the submitted model number. Reference data shall be used for validating this alignment	inverterDeviceCapacity	Account- holder and NSP	2050	These exceptions cannot be acknowledged.
For accredited inverters, "What standard applies to the inverter" attribute must be aligned with the submitted model number. Reference data shall be used for validating this alignment	inverterStandard	Account- holder and NSP	2051	

For accredited inverters, "Model Number" attribute must be aligned with the submitted Manufacturer Reference data shall be used for validating this alignment	Inverter modelNumber	Account-holder and NSP	2052	
For accredited inverters, "Inverter Series" attribute must be aligned with the submitted Manufacturer and model number Reference data shall be used for validating this alignment	series	Account-holder and NSP	2053	
For accredited batteries (storage), "Nominal rated capacity" must be aligned with the submitted model number. Reference data shall be used for validating this alignment	nominalRatedCapacity	Account-holder and NSP	2060	

For accredited batteries (storage), "Nominal storage capacity" must be aligned with the submitted model number. Reference data shall be used for validating this alignment	nominalStorageCapacity	Account-holder and NSP	2061	
For accredited batteries (Storage) or Solar PVs , "Model Number" must be aligned with the Reference data shall be used for validating this alignment submitted Manufacture.	Device modelNumber	Account-holder and NSP	2062	

4. Account-holder APIs

4.1 Design

Using the JSON format, Account-holders can:

- Submit DER Connection Agreement data.
- Provide AC Connections, and Device information in the same submission.

4.2 GET initiateLogin

4.2.1 Description

This API redirects the Account-holder to the login page, where they can register or log in (if already registered). After successfully logging in, the Account-holder is redirected to the relevant page.

4.2.2 Request

Item	Value
URL Path	/initiateLogin
Method	GET
Ex	<pre>GET /initiateLogin?clientId={client_Id}&scopes=DERR_INSTALLER&replyURL={reply_URL}&nonce={nonce}&codeChallenge={code_challenge}</pre> <p>clientId = client key associated with the registered App replyURL = URL where the user is redirected to after successful login nonce = GUID generated by the application codeChallenge = Base64 URL-encoded SHA-256 hash of the code verifier. Note: You will need to replace all the front and back slashes in the code challenge with _ (underscore).</p>

4.3 POST requestAccessToken

4.3.1 Description

This API returns an access token, access token expiry time in seconds, Id token, refresh token and refresh token expiry time in seconds after a successful authentication.

4.3.2 Request

Item	Value
------	-------

URL Path	/requestAccessToken
Method	POST
Header	<p>Include the following information in the header:</p> <p>grant_type = authorisation_code</p> <p>client_id = client key associated with the registered App</p> <p>code = authorization code received as part of login process</p> <p>redirect_uri = the application URL</p> <p>nonce = GUID generated during the login process</p> <p>code_verifier = random URL-safe string generated by the application</p>

4.3.3 Valid Submission Response

Item	Value
Response Code	200
Header	<p>Standard response header attributes:</p> <p>Content-Type: application/json</p> <p>Content-Encoding: As requested [gzip, compress, deflate]</p>
Body	<pre>{ "transactionID": "string", "access_token": "string", "access_token_expires_in": "string", "id_token": "string", "refresh_token": "string", "refresh_token_expires_in": "string"}</pre>
Ex	<pre>{ "transactionID": "b85a35f8-f741-40ac-a701-a8cfebb25669", "access_token": "Gy3TJkeHAC3bDxO2YBp", "access_token_expires_in": "3599", "id_token": "eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzdWIiOiIxMjM0NTY3ODkwIiwiaXNjaWkiOiJkpwG4gRG9lIiwiaWF0IjoxNTE2MjM5MDIyfQ.SflKxwRJSMeKKF2QT4fwpMeJf36POk6yJV_adQssw5c", "refresh_token": "HP7JWMOAvrPpObBsFycIOjpX9yRnrZLr", "refresh_token_expires_in": "86399999" }</pre>

4.4 POST refreshAccessToken

4.4.1 Description

This API is used by Account-holders to get a new access token when the existing access token has expired.

4.4.2 Request

Item	Value
URL Path	/refreshAccessToken
Method	POST
Header	Include the following information in the header: grant_type = refresh_token refresh_token = refresh token from the /requestAccessToken response client_id = client key associated with the registered App

4.4.3 Valid Submission Response

Item	Value
Response Code	200
Header	Standard response header attributes: Content-Type: application/json Content-Encoding: As requested [gzip, compress, deflate]
Body	<pre>{ "transactionID": "string", "access_token": "string", "access_token_expires_in": "string", "refresh_token": "string", "refresh_token_expires_in": "string" }</pre>
Example	<pre>{ "transactionID": "rrt-7144868795601672183-c-gsyl-13780-3601005-1", "access_token": "wHvxlsvnZPvKAvNOtG8rdQGtzk4E", "access_token_expires_in": "3599", "refresh_token": "HP7JWMOAvrPpObBsFycIOjpX9yRNrZLr", "refresh_token_expires_in": "86396399" }</pre>

4.5 POST submitDER

4.5.1 Description

Participants can submit a single DER Record data at any stage of the process. They can also use this API to:

- Submit Connection Agreement,
- Update an existing DER record,
- Resolve exceptions.

4.5.2 Request

Item	Value
URL Path	/submitDER
Method	POST
Header	Standard request header attributes, be sure to include: Authorization: Basic Content-Encoding: Should be one of [gzip, deflate, compress] Accept-Encoding: Should be one or more of [gzip, deflate, compress]
Body	<pre>{ "data" : { "nmi" : "string", "jobNumber" : "string", "approvedCapacity": "number", "availablePhasesCount" : "number", "installedPhasesCount": "number", "islandableInstallation" : "string", "centralProtectionControl" : "string", "exportLimitkva" : "number", "underFrequencyProtection" : "number", "underFrequencyProtectionDelay" : "number", "overFrequencyProtection" : "number", "overFrequencyProtectionDelay" : "number", "underVoltageProtection" : "number", "underVoltageProtectionDelay" : "number", "overVoltageProtection" : "number", "overVoltageProtectionDelay" : "number", "sustainedOverVoltage" : "number", "sustainedOverVoltageDelay" : "number", "frequencyRateOfChange" : "number", "voltageVectorShift" : "number", "interTripScheme" : "string", "neutralVoltageDisplacement" : "number", "installerId" : "string", "submitMode" : "string", "comments" : "string", } }</pre>

```

"acConnections":
[
  {
    "connectionId" : "number",
    "nspConnectionId" : "string",
    "commissioningDate" : "string",
    "equipmentType" : "string",
    "count" : "number",
    "statusCode" : "string",
    "frequencyRateOfChange" : "number",
    "voltageVectorShift" : "number",
    "interTripScheme" : "string",
    "neutralVoltageDisplacement" : "number",
    "details" :
    {
      "dredInverterInteraction" : "string",
      "serialNumbers" : ["string"],
      "manufacturerName" : "string",
      "modelName" : "string",
      "inverterSeries" : "string",
      "inverterStandard" : "string",
      "inverterDeviceCapacity" : "number",
      "sustainOpOvervoltLimit" : "number",
      "stopAtOverFreq" : "number",
      "stopAtUnderFreq" : "number",
      "invVoltWattRespMode" : "string",
      "invWattRespV1" : "number",
      "invWattRespV2" : "number",
      "invWattRespV3" : "number",
      "invWattRespV4" : "number",
      "invWattRespPAtV1" : "number",
      "invWattRespPAtV2" : "number",
      "invWattRespPAtV3" : "number",
      "invWattRespPAtV4" : "number",
      "invVoltVarRespMode" : "string",
      "invVarRespV1" : "number",
      "invVarRespV2" : "number",
      "invVarRespV3" : "number",
      "invVarRespV4" : "number",
      "invVarRespQAtV1" : "number",
      "invVarRespQAtV2" : "number",
      "invVarRespQAtV3" : "number",
      "invVarRespQAtV4" : "number",
      "invReactivePowerMode" : "string",
      "invFixReactivePower" : "number",
      "fixPowerFactorMode" : "string",
      "fixPowerFactor" : "number",
      "fixPowerFactorQuad" : "string",
      "powerRespMode" : "string",
      "referencePointP1" : "number",
      "referencePointP2" : "number",
      "powerFactorAtP1" : "number",
      "powerFactorQuadAtP1" : "string",
      "powerFactorAtP2" : "number",
      "powerFactorQuadAtP2" : "string",
    }
  }
]

```

```

        "powerRateLimitMode" : "string",
        "powerRampRate" : "number",
        "reactivePowerRegulation" : "string",
        "voltageSetPoint" : "number",
        "voltageSetPointUnit" : "string",
        "deadband" : "number",
        "droop" : "number",
        "baseForDroop" : "number",
        "reactivePowerSourceLimit" : "number",
        "reactivePowerSinkLimit" : "number",
        "reactiveFixPowerFactor" : "number",
        "reactiveFixPowerFactorQuad" : "string",
        "generatorRampRate" : "number",
        "powerRampGradient" : "number",
        "frequencySensitiveMode" : "string",
        "frequencyDeadband" : "number",
        "frequencyDroop" : "number"
    },
    "devices" :
    [
        {
            "deviceId" : "number",
            "nspDeviceId" : "string",
            "type" : "string",
            "subType" : "string",
            "count" : "number",
            "status" : "string",
            "details" :
            {
                "manufacturerName" : "string",
                "modelName" : "string",
                "nominalRatedCapacity" : "number",
                "nominalStorageCapacity" : "number"
            },
            "required" : ["type"]
        }
    ],
    "required" : ["equipmentType", "devices"]
},
"exceptions" :
[
    {
        "exceptionId" : "number",
        "nspAcknowledged" : "string"
    }
],
"required": ["nmi", "jobNumber", "approvedCapacity",
"availablePhasesCount", "installedPhasesCount",
"islandableInstallation", "centralProtectionControl",
"acConnections"]
}
}

```

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
nmi	N/A	string(10)	M	Unique identifier for each connection point where DER installation has been installed/approved.	
jobNumber	N/A	string(30)	M	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	Specified by the NSP. This number will be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
approvedCapacity	N/A	number(8,3)	M	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Can be distinct or equal to an export limitation. Permitted range is between 0 and 30,000.
availablePhasesCount	N/A	number(1)	M	The number of phases available for the installation of DER.	Permitted values: 1, 2, or 3.
installedPhasesCount	N/A	number(1)	M	The number of phases that DER is connected to.	Permitted values: 1, 2, or 3.

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
islandableInstallation	N/A	string(3)	M	Identifies small generating units designed with the ability to operate in an islanded mode.	Permitted values: Yes, or No.
centralProtectionControl	See 3.9.2, page 170.	string(3)	M	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Used to describe the type(s) of central protection to be applied to the DER system. Permitted values: Yes, or No.
exportLimitkva	See 3.9.2, page 170.	number(8,3)	O	Export limit (kVA) Maximum amount of power (kVA) that may be exported from a connection point to the grid, as monitored by a control / relay function.	A null value indicates no limit. Permitted range is between 0 and 30,000.
underFrequencyProtection	See 3.9.2, page 170.	number(4,2)	O	Under frequency protection in Hz.	These settings are described in AS4777.1:2016 Table 2
underFrequencyProtectionDelay	See 3.9.2, page 170.	number(4,3)	O	Under frequency protection delay in seconds.	

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
overFrequencyProtection	See 3.9.2, page 170.	number(4,2)	O	Over frequency protection in Hz	Described in AS4777.1:2016 Table 2.
overFrequencyProtectionDelay	See 3.9.2, page 170.	number(4,3)	O	Over frequency protection delay in seconds	
underVoltageProtection	See 3.9.2, page 170.	number(9,3)	O	Under voltage protection in volts (V)	Described in AS4777.1:2016 Table 2.
underVoltageProtectionDelay	See 3.9.2, page 170.	number(4,3)	O	Under voltage protection delay in seconds	
overVoltageProtection	See 3.9.2, page 170.	number(9,3)	O	Over voltage protection in volts (V)	Described in AS4777.1:2016 Table 2.
overVoltageProtectionDelay	See 3.9.2, page 170.	number(4,3)	O	Over voltage protection delay in seconds	
sustainedOverVoltage	See 3.9.2, page 170.	number(9,3)	O	Sustained Over voltage protection in volts (V)	Described in AS4777.1:2016 Table 2.
sustainedOverVoltageDelay	See 3.9.2, page 170.	number(5,3)	O	Sustained Over voltage protection delay in seconds.	

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
frequencyRateOfChange		number(4,3)	O	Rate of change of frequency trip point (Hz/s).	Permitted range is between 0 and 4 (inclusive).
voltageVectorShift		number(4,2)	O	Trip angle (Deg.)	
interTripScheme		string(100)	O	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement		number(7,3)	O	Trip voltage (V)	
installerId		string(50)	O	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier is the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
submitMode		Varchar(6)	O		<p>This attribute is NOT applicable to NSPs. It is to be used by Account-holders. Any submitted value by NSP shall be rejected.</p> <p>Permitted values is one of the following:</p> <ul style="list-style-type: none"> - Save - Submit
comments		string(2000)	O	Comments to help with DER Submission.	NSPs can add notes for the Connection process. These comments for NSP internal use only.
acConnections					
connectionId		number(15)	O	<p>Unique identifier for each AC Connection or Group in a DER installation.</p> <p>Note:</p> <ul style="list-style-type: none"> a. Use Null if adding a new AC Connection. b. Use existing connectionId for updating an existing record. 	<p>This is system generated by AEMO.</p> <p>Permitted value is either: Null, or an existing connectionId that has been previously generated by AEMO's system.</p> <p>AEMO's system will reject submission if connectionId is none of the above.</p>
nspConnectionId		string(50)	O	An AC Connection identifier used by NSP internally	NSPs can use this field link their internal ID with AEMO's generated connectionId.

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
commissioningDate		string (YYYY-MM-DD)	O	The date that an AC Connection becomes "Active".	This date and AC Connection RecordConfirmedDate are needed to monitor / manage obligation on timeframe to complete submission of record. Commissioning date can be in the past, present or the future.
equipmentType		string(20)	M	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted values: Inverter, or Other.
count		number(5)	O	Number of AC Connections in the group. For the suite of AC Connections to be considered as a group, all AC Connections included must have the same attributes.	

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
statusCode		string(20)	O	Code used to indicate the status of the AC Connection. This will be used to identify if an AC Connection is active or inactive or decommissioned. This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.	This status is only applicable on AC Connections. Note: This is not a duplicate of the NMI level status, as inverters may become active or inactive without a change of status to the overall system. Permitted values are Inactive, Active, or Decommissioned. Inactive: an AC Connection record that is created but that AC Connection is NOT physically installed or operating yet. Active: an AC Connection record that is physically installed and operating. Decommissioned: an AC Connection that used to operate, and it is NOT operating any more.
frequencyRateOfChange		number(4,3)	O	Rate of change of frequency (Hz/s)	Permitted value is between 0 and 4 (inclusive).
voltageVectorShift		number(4,2)	O	Trip angle (Deg.)	
interTripScheme		string(100)	O	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement		number(7,3)	O	Trip voltage (V)	

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Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
dredInverterInteraction	If equipmentType = inverter	string(3)	O		Permitted values are Yes, or No.
serialNumbers		string(array)	O	The serial number of the device(s)	<p>If the equipment type = Inverter, the number of Serial Numbers (where entered) required must match the number of AC Connections.</p> <p>For example, if "count" = 3, then "serialNumbers" (where entered) must = 3.</p> <ul style="list-style-type: none"> - For NSP APIs, "serialNumbers" can be NULL. - For Account-holder APIs, "serialNumbers" must be entered and the above rule applies or the API will return an Exception 1021. <p>The maximum number of serial numbers permissible is 999.</p>
manufacturerName	If equipmentType = inverter	string(120)	O	The name of the inverter manufacturer	<p>Using DER Web, a list of accredited manufactures will be listed.</p> <p>If selected value = Other, the user needs to specify</p>
modelName		string(120)	O	The model number of the inverter.	<p>Using DER Web, a list of accredited model numbers will be listed.</p> <p>If selected value = Other, the user needs to specify</p>
inverterSeries		string(50)	O	The inverter series.	<p>Using DER Web, a list of accredited series will be listed.</p> <p>If selected value = Other, the user needs to specify</p>

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
inverterStandard		string(150)	O	What standard/s is the inverter manufactured, tested and installed to? Examples include AS4777.2:2015, IEC 62109-1 and IEC 62019-2.	Using DER web, if the selected "modelName" is accredited, this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually. The auto-populated value is obtained from reference data
inverterDeviceCapacity		number(9,3)	O	The rated AC output power that is listed in the product specified by the manufacturer. This value refers to a single device.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually. The auto-populated value is obtained from reference data
sustainOpOvervoltageLimit		number(7,3)	O	Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the $V_{nom-max}$. The unit is in (V)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values are provided in submitPreferences API, the user manually provides these details. This setting is described in AS4777.2:2015, section 7.5.2.

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
stopAtOverFreq		number(4,2)	O	Frequency (stop). In Hz Permitted range is between 51 and 52 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values are provided in submitPreferences API, the user manually provides these details. This setting is described in AS4777.2:2015, section 7.5.3.
stopAtUnderFreq		number(4,2)	O	Frequency (stop). In Hz Permitted range is between 47 and 49 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values are provided in submitPreferences API, the user manually provides these details. This setting is described in AS4777.2:2015, section 7.5.3.
invVoltWattResp Mode	If equipmentType = inverter	string(15)	O	This mode is described in AS4777.2:2015, section 6.3.2.2. Permitted Value is either Enabled or Not Enabled	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values are provided in submitPreferences API, the user manually provides these details. This mode and the below set points are described in AS4777.2:2015, section 6.3.2.2.

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
invWattRespV1	If invVoltWattRes pMode = Enabled	number(7,3)	O	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.2.
invWattRespV2		number(7,3)	O	Unit is in (V). Permitted range is between 216 and 230 (inclusive)	
invWattRespV3		number(7,3)	O	Unit is in (V). Permitted range is between 235 and 255 (inclusive)	

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
invWattRespV4		number(7,3)	O	Unit is in (V). Permitted range is between 244 and 265 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.2.
invWattRespPAtV 1		number(6,3)	O	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.2.
invWattRespPAtV 2		number(6,3)	O	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.2.

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
invWattRespPAtV3		number(6,3)	O	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.2.
invWattRespPAtV4		number(6,3)	O	Unit is in (%) Permitted range is between 0 and 20 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.2.
invVoltVarRespMode	If equipmentType = inverter	string(15)	O	This mode is described in AS4777.2:2015, section 6.3.2.3. Permitted Value is either Enabled or Not Enabled	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. This mode and below set points are described in AS4777.2:2015, section 6.3.2.3.

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
invVarRespV1	If invVoltVarResp Mode = Enabled	number(7,3)	O	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.3.
invVarRespV2		number(7,3)	O	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.3.
invVarRespV3		number(7,3)	O	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.3.

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
invVarRespV4		number(7,3)	O	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.3.
invVarRespQAtV1		number(6,3)	O	Unit is in (%) Permitted range is between 0 and 60 (inclusive)	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.3.
invVarRespQAtV2		number(6,3)	O	Unit is in (%) Permitted range is between -100 and 100 (inclusive) . -ve sign refers to "sink"	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.3.

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Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
invVarRespQAtV3		number(6,3)	O	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.3.
invVarRespQAtV4		number(6,3)	O	Unit is in (%) Permitted range is between -60 and 0 (inclusive) -ve sign refers to "sink".	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.2.3.

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
invReactivePower Mode	If equipmentType = inverter	string(15)	O	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <p>Enabled</p> <p>Not Enabled</p> <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	<p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values are provided in submitPreferences API, the user manually provides these details.</p> <p>This mode and below set points are described in AS4777.2:2015, section 6.3.3.</p>
invFixReactivePower	If invReactivePowerMode = Enabled	number(6,3)	O	<p>Reactive Power.</p> <p>Specified in % output of the system.</p> <p>Permitted range is between -100 and 100 (inclusive).</p> <p>-ve sign refers to "sink"</p>	<p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values are provided in submitPreferences API, the user manually provides these details.</p> <p>See AS4777.2:2015, section 6.3.3.</p>

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
fixPowerFactorMode	If equipmentType = inverter	string(15)	O	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	<p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values are provided in submitPreferences API, the user manually provides these details.</p> <p>This mode and below set points are described in AS4777.2:2015, section 6.3.3.</p>
fixPowerFactor	If fixPowerFactorMode = Enabled	number(4,3)	O	<p>Permitted range is between 0.8 and 1 (inclusive)</p>	<p>Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values are provided in submitPreferences API, the user manually provides these details.</p> <p>See AS4777.2:2015, section 6.3.3.</p>

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
fixPowerFactorQu ad		string(10)	O	Permitted Value is one of the following: <ul style="list-style-type: none"> • Source • Sink 	Using the DER web interface, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values are provided in submitPreferences API, the user manually provides these details. See AS4777.2:2015, section 6.3.3.
powerRespMode	If equipmentType = inverter	string(15)	O	Select which power quality response modes are enabled on the inverter. Permitted Value is one of the following: Enabled Not Enabled It should = "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.	This mode and below set points are described in AS4777.2:2015, section 6.3.4.
referencePointP1		number(6,3)	O	Unit is in (%)	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range.
referencePointP2		number(6,3)	O	Unit is in (%)	

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
powerFactorAtP1	If powerRespMode = Enabled	number(4,3)	O	Permitted range is between 0.9 and 1 (inclusive)	<p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values provided in submitPreferences API, the user shall manually provide them</p> <p>These settings are described in AS4777.2:2015, section 6.3.2.1.</p> <p>The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installation.</p>
powerFactorQuadAtP1		string(10)	O	Permitted Value is one of the following: <ul style="list-style-type: none"> - Source - Sink 	
powerFactorAtP2		number(4,3)	O	Permitted range is between 0.9 and 1 (inclusive)	
powerFactorQuadAtP2		string(10)	O	Permitted Value is one of the following: <ul style="list-style-type: none"> - Source - Sink 	
powerRateLimitMode	If equipmentType = inverter	string(15)	O	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> - Enabled - Not Enabled 	<p>This mode is described in AS4777.2:2015, section 6.3.5.3.3. Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values provided in submitPreferences API, the user shall manually provide them.</p>

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
powerRampRate	If powerRateLimitMode = Enabled	number(6,3)	O	Unit is W _{Gra} , The power rate limit range shall be adjustable in the range of 5 - 100 of rated power per minute	As described in AS4777.2:2015, section 6.3.5.1. Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values provided in submitPreferences API, the user shall manually provide them
reactivePowerRegulation	If equipmentType = other	string(20)	O		Permitted Value is one of the following: - None - Voltage droop - Fixed power factor
voltageSetPoint	If reactivePowerRegulation = Voltage droop	number(9,3)	O	The voltage set point	Units can be in either % or V
voltageSetPointUnit		string(1)	O	The unit for VoltageSetPoint	Permitted Value is one of the following: % V
deadband		number(6,3)	O	± x%	
droop		number(5,3)	O	In %	
baseForDroop		number(8,3)	O	In kVA	
reactivePowerSourceLimit		number(8,3)	O	kVAr	
reactivePowerSinkLimit		number(8,3)	O	kVAr	

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
reactiveFixPowerFactor	If reactivePowerRegulation = Fixed power factor	number(4,3)	O		Permitted range is between 0 and 1 (inclusive)
reactiveFixPowerFactorQuad	If reactivePowerRegulation = Fixed power factor	string(10)	O		Permitted Value is one of the following: <ul style="list-style-type: none"> • Source • Sink
generatorRampRate	If equipmentType = other	string(15)	O		A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled
powerRampGradient	If generatorRampRate = Enabled	number(6,3)	O	Power ramp rate (%/min)	
frequencySensitiveMode	If equipmentType = other	string(15)	O		A generator may operate in a frequency sensitive mode whereby it adjusts output to help support frequency control. A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled
frequencyDeadband	If frequencySensi	number(6,3)	O	In Hz	

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
frequencyDroop	tiveMode = Enabled	number(4,2)	O	In %	
devices					
deviceld		number(15)	O	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO.</p> <p>Permitted value is either: Null; or an existing deviceld that has been previously generated by AEMO's system; AEMO's system will reject submission if deviceld is none of the above. Null shall be used in the event of adding a new record. Existing deviceld will be used for updating an existing record</p>
nspDeviceld		string(50)	O	A DER Device identifier that is used by NSP internally	This is provided to assist participants with linking their internal ID with AEMO's generated deviceld

4. Account-holder APIs, 4.5 POST submitDER 4.5.2 Request

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
type		string(50)	M	Used to indicate the primary technology used in the DER device.	<p>Expected Values is one of the following:</p> <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other <p>"Other" is only applicable in the DER web portal. Selecting "Other" will request the user to specify.</p> <p>Using API, it is accepted to submit a device type that is not in the list. There is no validation applied on this.</p>

subType	string(50)	O	Used to indicate the primary technology used in the DER device.	<p>This field is also used to record for example the battery chemistry, or the type of PV panel. It is also used to record if a battery is contained in an electric vehicle connected in a vehicle-to-grid arrangement.</p> <p>If Type = Solar PV, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Monocrystalline - Polycrystalline - Crystalline - Thin-film - Concentrating PV - Silicon - Biohybrid - Cadmium telluride - Other <p>If Type = Storage, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Lithium-ion - Lead acid - Lead carbon - Sodium nickel - Lead crystal - Absorbed glass matt - Vanadium - Aqueous hybrid ion - Tubular gel - Zinc bromide - Electric Vehicle - Other <p>"Other" is only applicable in the web portal. Selecting "Other" will request the user to specify.</p>
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Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
					Using API, it is accepted to submit a device sub-type that is not in the list. There is no validation applied on this.
count		number(5)	O	number of devices in the group of DER devices.	

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
status		string(20)	O	<p>Code used to indicate the status of the DER Device. This will be used to identify if a Device is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • Inactive • Active • Decommissioned 	<p>This status is only applicable on DER Device. This is not a duplicate of the NMI level status, as Devices may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an DER Device record that is created but that DER Device is NOT physically installed or operating yet.</p> <p>Active: an DER Device record that is physically installed and operating</p> <p>Decommissioned: an DER Device that used to operate, and it is NOT operating any more.</p>
manufacturerName		string(120)	O	The name of the device manufacturer	<p>Using DER Web, a list of accredited manufactures will be listed.</p> <p>If selected value = Other, the user needs to specify</p>

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
modelName		string(120)	O	The model number of the device.	Using DER Web, a list of accredited model numbers will be listed. If selected value = Other, the user needs to specify
nominalRatedCapacity		number(8,3)	O	Maximum output in kVA that is listed in the product specification by the manufacturer. This refers to the capacity of each unit within the device group.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually. The auto-populated value is obtained from reference data.
nominalStorageCapacity	If type = Storage	number(9,3)	O	Maximum storage capacity in kWh. This refers to the capacity of each storage module within the device group.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually. The auto-populated value is obtained from reference data.

Field	Applies When	Type	Mandatory (M) /Optional (O)	Description	Comments
exceptions					
exceptionId		number	O	A unique identification for an exception generated when business validation fails	<p>This value is integer and System generated.</p> <p>This Id will be generated by AEMO upon a submission that fails business validation</p> <p>Permitted value is one of the following: an existing exceptionId that was previously generated by AEMO; or Null</p> <p>If the exceptionId was not generated by AEMO, the system will reject the submission.</p>
nspAcknowledged	If "exceptionId" is provided	string(3)	O	<p>This is used when there is an exception but the user acknowledges it without resolving/editing the exception.</p> <p>For example, if model number is not accredited, AEMO will generate an exception. The user will have the ability to acknowledge it and exception will be closed.</p>	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> - Yes - No <p>Yes indicates that the user acknowledged the exception and AC Connection or Device will become "Confirmed" (provided no other exceptions).</p> <p>No will do nothing to the exception, and it will stay open.</p>

4.5.3 Valid Submission Response

Item	Value
Response Code	200
Header	<p>Standard response header attributes:</p> <p>Content-Type: application/json</p> <p>Content-Encoding: As requested [gzip, compress, deflate]</p> <p>Accept-Encoding: As requested [gzip, compress, deflate]</p>
Body	<pre>{ "transactionId" : "string", "data" : { "nmi" : "string", "jobNumber" : "string", "recordUpdateDate" : "string", "approvedCapacity": "number", "availablePhasesCount" : "number", "installedPhasesCount": "number", "islandableInstallation" : "string", "centralProtectionControl" : "string", "exportLimitkva" : "number", "underFrequencyProtection" : "number", "underFrequencyProtectionDelay" : "number", "overFrequencyProtection" : "number", "overFrequencyProtectionDelay" : "number", "underVoltageProtection" : "number", "underVoltageProtectionDelay" : "number", "overVoltageProtection" : "number", "overVoltageProtectionDelay" : "number", "sustainedOverVoltage" : "number", "sustainedOverVoltageDelay" : "number", "frequencyRateOfChange" : "number", "voltageVectorShift" : "number", "interTripScheme" : "string", "neutralVoltageDisplacement" : "number", "installerId" : "string", "submitterId" : "string", "submitterClass" : "string", "submitMode" : "string", "comments" : "string", "acConnections": [{ "connectionId" : "number", "nspConnectionId" : "string", "recordCreationDate" : "string", "recordConfirmedDate" : "string",</pre>

```

"recordEndDate" : "string",
"commissioningDate" : "string",
"installationStage" : "string",
"equipmentType" : "string",
"cecConnectionId" : "string",
"count" : "number",
"statusCode" : "string",
"frequencyRateOfChange" : "number",
"voltageVectorShift" : "number",
"interTripScheme" : "string",
"neutralVoltageDisplacement" : "number",
"details" :
{
  "dredInverterInteraction" : "string",
  "serialNumbers" : ["string"],
  "manufacturerOther" : "boolean",
  "manufacturerName" : "string",
  "modelOther" : "boolean",
  "modelName" : "string",
  "inverterSeriesOther" : "boolean",
  "inverterSeries" : "string",
  "inverterStandard" : "string",
  "inverterDeviceCapacity" : "number",
  "sustainOpOvervoltLimit" : "number",
  "stopAtOverFreq" : "number",
  "stopAtUnderFreq" : "number",
  "invVoltWattRespMode" : "string",
  "invWattRespV1" : "number",
  "invWattRespV2" : "number",
  "invWattRespV3" : "number",
  "invWattRespV4" : "number",
  "invWattRespPAtV1" : "number",
  "invWattRespPAtV2" : "number",
  "invWattRespPAtV3" : "number",
  "invWattRespPAtV4" : "number",
  "invVoltVarRespMode" : "string",
  "invVarRespV1" : "number",
  "invVarRespV2" : "number",
  "invVarRespV3" : "number",
  "invVarRespV4" : "number",
  "invVarRespQAtV1" : "number",
  "invVarRespQAtV2" : "number",
  "invVarRespQAtV3" : "number",
  "invVarRespQAtV4" : "number",
  "invReactivePowerMode" : "string",
  "invFixReactivePower" : "number",
  "fixPowerFactorMode" : "string",
  "fixPowerFactor" : "number",
  "fixPowerFactorQuad" : "string",
  "powerRespMode" : "string",
  "referencePointP1" : "number",
  "referencePointP2" : "number",
  "powerFactorAtP1" : "number",
  "powerFactorQuadAtP1" : "string",
  "powerFactorAtP2" : "number",

```

```

        "powerFactorQuadAtP2" : "string",
        "powerRateLimitMode" : "string",
        "powerRampRate" : "number",
        "reactivePowerRegulation" : "string",
        "voltageSetPoint" : "number",
        "voltageSetPointUnit" : "string",
        "deadband" : "number",
        "droop" : "number",
        "baseForDroop" : "number",
        "reactivePowerSourceLimit" : "number",
        "reactivePowerSinkLimit" : "number",
        "reactiveFixPowerFactor" : "number",
        "reactiveFixPowerFactorQuad" : "string",
        "generatorRampRate" : "number",
        "powerRampGradient" : "number",
        "frequencySensitiveMode" : "string",
        "frequencyDeadband" : "number",
        "frequencyDroop" : "number"
    },
    "devices" :
    [
        {
            "deviceId" : "number",
            "nspDeviceId" : "string",
            "recordCreationDate" : "string",
            "recordCommissioningDate" : "string",
            "recordConfirmedDate" : "string",
            "recordEndDate" : "string",
            "cecDeviceId" : "string",
            "type" : "string",
            "subType" : "string",
            "count" : "number",
            "status" : "string",
            "installationStage" : "string",
            "details" :
            {
                "typeOther" : "boolean",
                "subTypeOther" : "boolean",
                "manufacturerOther" : "boolean",
                "manufacturerName" : "string",
                "modelOther" : "boolean",
                "modelName" : "string",
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                "nominalStorageCapacity" : "number"
            }
        }
    ]
},
"exceptions" :
[
    {
        "exceptionId" : "number",
        "code" : "number",
        "name" : "string",

```

```

        "affectedAttributes" : ["string"],
        "details" : "string",
        "status" : "string",
        "deviceId" : "number",
        "connectionId" : "number",
        "nspAcknowledged" : "string"
    }
],
"receipt" :
{
    "nmi" : "string",
    "jobNumber" : "string",
    "disclaimer" : "string",
    "derJobCompleteDate" : "string",
    "installerId" : "string",
    "approvedCapacity": "number",
    "confirmationLengthTime" : "number",
    "centralProtectionControl" : "string",
    "acConnections" :
    [
        {
            "connectionId" : "number",
            "equipmentType" : "string",
            "installedCapacity": "number",
            "manufacturerName" : "string",
            "modelName" : "string"
        }
    ],
    "devices" :
    [
        {
            "deviceId" : "number",
            "type" : "string",
            "installedCapacity": "number",
            "manufacturerName" : "string",
            "modelName" : "string"
        }
    ]
}
}
}

```

Field	Applies When	Type	Description	Comments
nmi	N/A	string(10)	Unique identifier for each connection point where DER installation has been installed/approved	

Field	Applies When	Type	Description	Comments
jobNumber	N/A	string(30)	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works	This identifier is specified by the NSP as per their connection process. This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
recordUpdateDate	N/A	string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Record was updated.	AEMO will store a history of all versions changes and it can be tracked via this date. A new version is generated every time a new submission or update happens
approvedCapacity	N/A	number(8,3)	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Can be distinct or equal to an export limitation. Permitted range is between 0 and 30,000
availablePhasesCount	N/A	number(1)	The number of phases available for the installation of DER.	Permitted value is one of the following: <ul style="list-style-type: none"> • 1 • 2 • 3
installedPhasesCount	N/A	number(1)	The number of phases that DER is connected to.	Permitted value is one of the following: <ul style="list-style-type: none"> • 1 • 2 • 3
islandableInstallation	N/A	string(3)	For identification of small generating units designed with the ability to operate in an islanded mode.	Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No

Field	Applies When	Type	Description	Comments
centralProtectionControl	See 3.9.2, page 170.	string(3)	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Used to describe the type(s) of central protection to be applied to the DER system. Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
exportLimitkva	See 3.9.2, page 170.	number(8,3)	Export limit (kVA) Maximum amount of power (kVA) that may be exported from a connection point to the grid, as monitored by a control / relay function. A null value indicates no limit. Permitted range is between 0 and 30,000	
underFrequencyProtection	See 3.9.2, page 170.	number(4,2)	Under frequency protection in Hz Permitted range is between 45 and 50 (inclusive)	
underFrequencyProtectionDelay	See 3.9.2, page 170.	number(4,3)	Under frequency protection delay in seconds	
overFrequencyProtection	See 3.9.2, page 170.	number(4,2)	Over frequency protection in Hz Permitted range is between 50 and 55 (inclusive)	
overFrequencyProtectionDelay	See 3.9.2, page 170.	Number(4,3)	Over frequency protection delay in seconds	
underVoltageProtection	See 3.9.2, page 170.	number(9,3)	Under voltage protection in volts (V)	

Field	Applies When	Type	Description	Comments
underVoltageProtectionDelay	See 3.9.2, page 170.	number(4,3)	Under voltage protection delay in seconds	
overVoltageProtection	See 3.9.2, page 170.	number(9,3)	Over voltage protection in volts (V)	
overVoltageProtectionDelay	See 3.9.2, page 170.	number(4,3)	Over voltage protection delay in seconds	
sustainedOverVoltage	See 3.9.2, page 170.	number(9,3)	Sustained over voltage protection in volts (V)	
sustainedOverVoltageDelay	See 3.9.2, page 170.	number(5,3)	Sustained over voltage protection delay in seconds. Permitted range is between 10 and 20 (inclusive).	
frequencyRateOfChange	See 3.9.2, page 170.	number(4,3)	Rate of change of frequency trip point (Hz/s). Permitted range is between 0 and 4 (inclusive)	
voltageVectorShift	See 3.9.2, page 170.	number(4,2)	Trip angle (Deg)	
interTripScheme	See 3.9.2, page 170.	string(100)	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement	See 3.9.2, page 170.	number(7,3)	Trip voltage (V)	

Field	Applies When	Type	Description	Comments
installerId		string(50)	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).
submitterId		string(50)	Records the user id that submitted this record	This is system generated by AEMO.
submitterClass		string(9)	Records the user classification whether it is NSP or others	Would be either "NSP" or "Installer"
submitMode		Varchar(6)		This attribute is NOT applicable to NSPs. It is to be used by Account-holders. Any submitted value by NSP shall be rejected. Permitted values is one of the following: - Save - Submit
comments		string(2000)	Comments to help with DER Submission.	This field shall help NSPs to write notes that help with the "Connection Process". These comments for NSP internal use only.
acConnections				
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	This is system generated by AEMO.

Field	Applies When	Type	Description	Comments
nspConnectionId		string(50)	An AC Connection identifier that is used by NSP internally	This is provided to assist participants with linking their internal ID with AEMO's generated connectionId
recordCreationDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record was created.	System generated and it is the date that the AC Connection gets submitted for the first time
recordConfirmedDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record becomes "Confirmed" for the first time	System generated. This date in combination with AC Connection commissioning date are needed to monitor / manage obligation on timeframe to complete submission of record.
recordEndDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record ends or becomes decommissioned.	System generated If DER Record is "Initial" or "Idle" and it is removed, this date will capture the removal date. If DER Record is "Conditional" or "Confirmed" and it is decommissioned, this date will capture the decommissioning date.

Field	Applies When	Type	Description	Comments
commissioningDate		string (YYYY-MM-DD)	The date that an AC Connection becomes "Active"	This date and AC Connection RecordConfirmedDate are needed to monitor / manage obligation on timeframe to complete submission of AC Connection. Commissioning date can be in the past, present or the future
installationStage		string(11)	Installation stage of the AC connection. This will be used to indicate to the user if the AC Connection is initial, conditional, confirmed, or idle. See 2.8, Installation stage.	Permitted value to be returned is one of the following: <ul style="list-style-type: none"> - Initial - Conditional - Confirmed - Idle
equipmentType		string(20)	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted value is one of the following: <ul style="list-style-type: none"> - Inverter - Other
cecConnectionId		string(30)	Unique device identifier to store CEC inverter reference data	This ID shall be returned if the submitted inverter is accredited
count		number(5)	Number of AC Connections in the group. For the suite of AC Connections to be considered as a group, all the AC Connections included must have the same attributes.	

Field	Applies When	Type	Description	Comments
statusCode		string(20)	<p>Code used to indicate the status of the AC Connection. This will be used to identify if an AC Connection is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • Inactive • Active • Decommissioned 	<p>This status is only applicable on AC Connections. This is not a duplicate of the NMI level status, as inverters may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an AC Connection record that is created but that AC Connection is NOT physically installed or operating yet.</p> <p>Active: an AC Connection record that is physically installed and operating.</p> <p>Decommissioned: an AC Connection that used to operate, and it is NOT operating any more.</p>
frequencyRateOfChange		number(4,3)	<p>Rate of change of frequency (Hz/s)</p> <p>Permitted value is between 0 and 4 (inclusive)</p>	
voltageVectorShift		number(4,2)	Trip angle (Deg.)	
interTripScheme		string(100)	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement		number(7,3)	Trip voltage (V)	

Field	Applies When	Type	Description	Comments
dredInverterInteraction	If equipmentType = inverter	string(3)		Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
serialNumbers		string(array)	The serial number of the device(s)	<p>If the equipment type = Inverter, the number of Serial Numbers (where entered) required must match the number of AC Connections.</p> <p>For example, if "count" = 3, then "serialNumbers" (where entered) must = 3.</p> <ul style="list-style-type: none"> • For NSP APIs, "serialNumbers" can be NULL. • For Account-holder APIs, "serialNumbers" must be entered and the above rule applies or the API will return an Exception 1021. <p>The maximum number of serial numbers permissible is 999.</p>
manufacturerOther		boolean	This is used to indicate if a manufacturer is accredited	Permitted value is one of the following: <ul style="list-style-type: none"> • true • false

Field	Applies When	Type	Description	Comments
manufacturerName	If equipmentType = inverter	string(120)	The name of the inverter manufacturer	Using DER Web, a list of accredited manufactures will be listed. If selected value = Other, the user needs to specify
modelOther		boolean	This is used to indicate if a model number is accredited	Permitted value is one of the following: <ul style="list-style-type: none"> • true • false
modelName		string(120)	The model number of the inverter.	Using DER Web, a list of accredited model numbers will be listed. If selected value = Other, the user needs to specify
inverterSeriesOther		boolean	This is used to indicate if an inverter series is accredited	Permitted value is one of the following: <ul style="list-style-type: none"> • true • false
inverterSeries		string(50)	The inverter series.	Using DER Web, a list of accredited model numbers will be listed. If selected value = Other, the user needs to specify

Field	Applies When	Type	Description	Comments
inverterStandard		string(100)	<p>What standard/s is the inverter manufactured, tested and installed to?</p> <p>Examples include AS4777.2:2015, IEC 62109-1 and IEC 62019-2.</p>	<p>Using DER web, if the selected "modelName" is accredited, this value will be auto-populated.</p> <p>If "modelName" is equal to "Other" This value will be entered manually.</p> <p>The auto-populated value is obtained from reference data</p>
inverterDeviceCapacity		number(9,3)	<p>The rated AC output power that is listed in the product specified by the manufacturer.</p> <p>This value refers to a single device.</p>	<p>Using DER web, if the selected "modelName" is accredited, this value will be auto-populated.</p> <p>If "modelName" is equal to "Other" This value will be entered manually.</p> <p>The auto-populated value is obtained from reference data</p>
sustainOpOvervolt Limit		number(7,3)	<p>Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the $V_{nom-max}$. The unit is in (V)</p>	<p>Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API.</p>
stopAtOverFreq		number(4,2)	<p>Frequency (stop). In Hz</p> <p>Permitted range is between 51 and 52 (inclusive)</p>	

Field	Applies When	Type	Description	Comments
stopAtUnderFreq		number(4,2)	Frequency (stop). In Hz Permitted range is between 47 and 49 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them
invVoltWattRespMode	If equipmentType = inverter	string(15)	Permitted Value is one of the following: Permitted Value is one of the following: Enabled Not Enabled	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API.
invWattRespV1	If invVoltWattRespMode = Enabled	number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them This mode is described in AS4777.2:2015, section 6.3.2.1.
invWattRespV2		number(7,3)	Unit is in (V). Permitted range is between 216 and 230 (inclusive)	
invWattRespV3		number(7,3)	Permitted range is between 235 and 255 (inclusive)	
invWattRespV4		number(7,3)	Unit is in (V). Permitted range is between 244 and 265 (inclusive)	
invWattRespPATV1		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPATV2		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPATV3		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	

Field	Applies When	Type	Description	Comments
invWattRespPAtV4		number(6,3)	Unit is in (%) Permitted range is between 0 and 20 (inclusive)	
invVoltVarRespMode	If equipmentType = inverter	string(15)	Permitted Value is one of the following: Enabled Not Enabled	
invVarRespV1	If invVoltVarRespMode = Enabled	number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespV2		number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespV3		number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespV4		number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespQAtV1		number(6,3)	Unit is in (%) Permitted range is between 0 and 60 (inclusive)	
invVarRespQAtV2		number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	

Field	Applies When	Type	Description	Comments
invVarRespQAtV3		number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	
invVarRespQAtV4		number(6,3)	Unit is in (%) Permitted range is between -60 and 0 (inclusive) -ve sign refers to "sink".	
invReactivePower Mode	If equipmentType = inverter	string(15)	Select which power quality response modes are enabled on the inverter. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.	
invFixReactivePower	If invReactivePowerMode = Enabled	number(6,3)	Reactive Power. Specified in % output of the system. Permitted range is between -100 and 100 (inclusive). -ve sign refers to "sink"	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on

Field	Applies When	Type	Description	Comments
fixPowerFactorMode	If equipmentType = inverter	string(15)	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> Enabled Not Enabled <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	<p>preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API , the user shall manually provide them</p>
fixPowerFactor	If fixPowerFactorMode = Enabled	number(4,3)	Permitted range is between 0.8 and 1 (inclusive)	
fixPowerFactorQuand		string(10)	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> Source Sink 	
powerRespMode	If equipmentType = inverter	string(15)	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> Enabled Not Enabled <p>It should = "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	
referencePointP1	If powerResp	number(6,3)	Unit is in (%)	
referencePointP2		number(6,3)	Unit is in (%)	Using DER Web, these values will be auto-populated

Field	Applies When	Type	Description	Comments
powerFactorAtP1	Mode = Enabled	number(4,3)	Permitted range is between 0.9 and 1 (inclusive)	based on "Inverter Device Capacity" range
powerFactorQuadAtP1		string(10)	Permitted Value is one of the following: Source Sink	Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API.
powerFactorAtP2		number(4,3)	Permitted range is between 0.9 and 1 (inclusive)	If no values provided in submitPreferences API, the user shall manually provide them
powerFactorQuadAtP2		string(10)	Permitted Value is one of the following: <ul style="list-style-type: none"> • Source • Sink 	The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installation.

Field	Applies When	Type	Description	Comments
powerRateLimitMode	If equipmentType = inverter	string(15)	Select which power quality response modes are enabled on the inverter.	<p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API , the user shall manually provide them</p> <p>This mode is described in AS4777.2:2015, section 6.3.5.3.3.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled

Field	Applies When	Type	Description	Comments
powerRampRate	If powerRateLimitMode = Enabled	number(6,3)	Unit is W _{Gra} . The power rate limit range shall be adjustable in the range of 5 - 100 of rated power per minute	Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API. If no values provided in submitPreferences API, the user shall manually provide them As described in AS4777.2:2015, section 6.3.5.1.
reactivePowerRegulation	If equipmentType = inverter	string(20)		Permitted Value is one of the following: - None - Voltage droop - Fixed power factor
voltageSetPoint	If reactivePowerRegulation = Voltage droop	number(9,3)	The set voltage point	
voltageSetPointUnit		string(1)	The unit for voltageSetPoint	Permitted Value is one of the following: - % - V
deadband		number(6,3)	± x%	
droop		number(5,3)	In %	
baseForDroop		number(8,3)	In kVA	
reactivePowerSourceLimit		number(8,3)	In Var	
reactivePowerSinkLimit		number(8,3)	In Var	

Field	Applies When	Type	Description	Comments
reactiveFixPowerFactor	If reactivePowerRegulation = Fixed power factor	number(4,3)		Permitted range is between 0 and 1 (inclusive)
reactiveFixPowerFactorQuad		string(10)		Permitted Value is one of the following: <ul style="list-style-type: none">• Source• Sink
generatorRampRate	If equipmentType = inverter	string(15)		A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none">• Enabled• Not Enabled
powerRampGradient	If generatorRampRate = Enabled	number(6,3)	Power ramp rate (%/min)	Permitted range is between 0 and 100 (inclusive)
frequencySensitiveMode	If equipmentType = inverter	string(15)		A generator may operate in a frequency sensitive mode whereby it adjusts output to help support frequency control. A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none">• Enabled• Not Enabled
frequencyDeadband	If frequencySensitiveMode = Enabled	number(6,3)	In Hz	
frequencyDroop		number(4,2)	In %	
devices				

Field	Applies When	Type	Description	Comments
deviceId		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO. Permitted value is either:</p> <ul style="list-style-type: none"> • Null; or • an existing deviceId that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceId is none of the above.</p> <p>Null shall be used in the event of adding a new record.</p> <p>Existing deviceId will be used for updating an existing record</p>
nspDeviceId		string(50)	A DER Device identifier that is used by NSP internally	This is provided to assist participants with linking their internal ID with AEMO's generated deviceId
recordCreationDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record was created.	
recordCommissioningDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record became active.	<p>This will either equal to: Commissioning date of the AC Connection linked to it, if they were created on the same date; OTHERWISE</p> <p>The date that the DER Device status becomes "Active"</p> <p>recordCommissioningDate can be in the past, or present</p>

Field	Applies When	Type	Description	Comments
recordConfirmedDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record became "Confirmed" for the first time	System generated. This date in combination with Device recordCommissioningDate are needed to monitor / manage obligation on timeframe to complete submission of record.
recordEndDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record ends/decommissioned	System generated If DER Record is "Initial" or "Idle" and it is removed, this date will capture the removal date. If DER Record is "Conditional" or "Confirmed" and it is decommissioned, this date will capture the decommissioning date.
cecDeviceId		string(30)	Unique device identifier to store CEC Device reference data	This ID shall be returned if the submitted device is accredited

Field	Applies When	Type	Description	Comments
type		string(50)	Used to indicate the primary technology used in the DER device.	<p>Expected Value is one of the following:</p> <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other <p>"Other" is only applicable in the web portal. Selecting "Other" will request the user to specify.</p> <p>Using API, it is accepted to submit a device type that is not in the list. There is no validation applied on this.</p>

subType	string(50)	Used to indicate the primary technology used in the DER device.	<p>This field is also used to record for example the battery chemistry, or the type of PV panel. It is also used to record if a battery is contained in an electric vehicle connected in a vehicle-to-grid arrangement.</p> <p>If Type = Solar PV, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Monocrystalline - Polycrystalline - Crystalline - Thin-film - Concentrating PV - Silicon - Biohybrid - Cadmium telluride - Other <p>If Type = Storage, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Lithium-ion - Lead acid - Lead carbon - Sodium nickel - Lead crystal - Absorbed glass matt - Vanadium - Aqueous hybrid ion - Tubular gel - Zinc bromide - Electric Vehicle - Other <p>If Type != Solar PV or Storage, the permitted value is "Other"</p> <p>"Other" is only applicable in the web portal. Selecting "Other" will request the user to specify.</p> <p>Using API, it is accepted to submit a device sub-type that is not in the list. There is no</p>
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Field	Applies When	Type	Description	Comments
				validation applied on this.
count		number(5)	Number of devices in the group of DER devices.	
status		string(20)	<p>Code used to indicate the status of the DER Device. This will be used to identify if a Device is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> - Inactive - Active - Decommissioned 	<p>This status is only applicable on DER Device. This is not a duplicate of the NMI level status, as Devices may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an DER Device record that is created but that DER Device is NOT physically installed or operating yet.</p> <p>Active: an DER Device record that is physically installed and operating.</p> <p>Decommissioned: an DER Device that used to operate, and it is NOT operating any more.</p>
installationStage		string(11)	<p>Installation stage of the DER Device.</p> <p>This will be used to indicate to the user if the DER Device is initial, conditional, confirmed, or idle.</p> <p>See 2.8, Installation stage.</p>	<p>Permitted value to be returned is one of the following:</p> <ul style="list-style-type: none"> - Initial - Conditional - Confirmed - Idle

Field	Applies When	Type	Description	Comments
typeOther	If type = Other	boolean	To indicate if the submitted device type is part of the provided list	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> - true - false <p>If the submitted device "type" is one of the list provided below, the returned value is false</p> <p>If the submitted device "type" is NOT one of the list provided below, the returned value shall be false</p>
subTypeOther	If subType = Other	boolean	To indicate if the submitted device subtype is part of the provided list	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • true • false <p>If the submitted device "subType" is one of the list provided below, the returned value shall be false</p> <p>If the submitted device "subType" is NOT one of the list provided below, the returned value shall be true</p>
manufacturerOther		boolean	This is used to indicate if a manufacturer is accredited	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • true • false
manufacturerName		string(120)	The name of the device manufacturer	Definitions align to the approved modules list.
modelOther		boolean	This is used to indicate if a model number is accredited	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • true • false
modelName		string(120)	The model number of the device.	Definitions align to the approved modules list.

Field	Applies When	Type	Description	Comments
nominalRatedCapacity		number(8,3)	Maximum output in kVA that is listed in the product specification by the manufacturer. This refers to the capacity of each unit within the device group.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually. The auto-populated value is obtained from reference data
nominalStorageCapacity	If Type = Storage	number(9,3)	Maximum storage capacity in kWh. This refers to the capacity of each storage module within the device group.	Using DER web, if the selected "modelName" is accredited , this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually. The auto-populated value is obtained from reference data
exceptions				
exceptionId		number	A unique identification for an exception generated when business validation fails	This Id is integer value and will be generated by AEMO upon a submission that fails business validation Permitted value of submission is one of the following: an existing exceptionId that was previously generated by AEMO Null If the ExceptionId was not generated by AEMO, the system will reject the submission.
code		number(4)	Code used to indicate the type of exception	

Field	Applies When	Type	Description	Comments
name		string(20)	Name of exception	
AffectedAttributes		string(300)	Lists the names of fields that were the reason for producing this exception	
details		string(200)	Description of the exception	
status		string(6)	Status of exception (Open or closed)	Permitted values is one of the following: <ul style="list-style-type: none"> • Open • Closed
deviceId		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO.</p> <p>Permitted value is either:</p> <ul style="list-style-type: none"> • Null; or • an existing deviceId that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceId is none of the above.</p> <p>Null shall be used in the event of adding a new record.</p> <p>Existing deviceId will be used for updating an existing record</p>

Field	Applies When	Type	Description	Comments
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	<p>This is system generated by AEMO. Permitted value is either:</p> <ul style="list-style-type: none"> - Null; or - an existing deviceId that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceId is none of the above.</p> <p>Null shall be used in the event of adding a new record.</p> <p>Existing connectionId will be used for updating an existing record</p>
nspAcknowledged		string(3)	<p>This is used when there is an exception but the user acknowledges it without resolving/editing the exception.</p> <p>For example, if model number is not accredited, AEMO will generate an exception. The user will have the ability to acknowledge it and exception will be closed.</p>	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> - Yes - No <p>Yes indicates that the user acknowledged the exception and record will become "Confirmed" (provided no other exceptions).</p> <p>No will do nothing to the exception and it will stay open.</p>
receipt				
nmi		string(10)	Unique identifier for each connection point where DER installation has been installed/approved	

Field	Applies When	Type	Description	Comments
jobNumber		string(30)	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	This identifier is specified by the NSP as per their connection process. This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
disclaimer		string	Standard disclaimer information provided to Account-holders after submitting DER record details.	Only returned to Account-holders. For NSPs, this is returned as null.
derJobCompleteDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when all AC Connections and DER Devices for a certain job become "Confirmed". It is the date that receipt is generated	System generated.
installerId		string(50)	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).
approvedCapacity		number(8,3)	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Can be distinct or equal to an export limitation. Permitted range is between 0 and 30,000

Field	Applies When	Type	Description	Comments
confirmationLengthTime		number(6,3)	The time of how long it took a job to be complete since records were active	The number of business days between derJobCompleteDate and the last commissioningDate/recordCommissioningDate for a DER Record during a certain job
centralProtectionControl		string(3)	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Used to describe the type(s) of central protection to be applied to the DER system. Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
receipt acConnections				
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	This is system generated by AEMO.
equipmentType		string(20)	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted value is one of the following: <ul style="list-style-type: none"> • Inverter • Other
installedCapacity	If EquipmentType= Inverter	number(8,3)	The total capacity of inverter that are installed during a certain job	It is a calculated value. It represents what is the total inverter capacity that is physically installed at site for a certain job number
manufacturerName		string(120)		Only returned to account-holders. For NSPs, this is returned as null.

Field	Applies When	Type	Description	Comments
modelNumber		string(120)		Only returned to account-holders. For NSPs, this is returned as null.
receipt devices				
deviceId		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	This is system generated by AEMO.
type		string(50)	Used to indicate the primary technology used in the DER device.	Expected Value is one of the following: <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other Other values might be returned depends on the submitted Device "type".
installedCapacity		number(8,3)	The total capacity of DER Devices installed during a job	It is a calculated value. It represents what is the total device capacity that is physically installed at site for a certain job number
manufacturerName		string(120)		Only returned to account-holders. For NSPs, this is returned as null.

Field	Applies When	Type	Description	Comments
modelNumber		string(120)		Only returned to account-holders. For NSPs, this is returned as null.

4.5.4 Invalid Submission Response

Item	Value
Response Code	422
Header	Standard response header attributes: Content-Type: application/json Content-Encoding: As requested [gzip, compress, deflate]
Body	<pre>{ "transactionId" : "string", "errors" : [{ "code": "string", "title": "string", "detail": "string", "source": "string" }] }</pre>

4.6 GET getPreferences

4.6.1 Description

This API is used by participants to get previously submitted preferences for contact details, Inverter Settings, and notifications based on approved capacity.

4.6.2 Valid Submission Response

Item	Value
Response Code	200

Header

Standard response header attributes:

Content-Type: application/json

Content-Encoding: As requested [gzip, compress, deflate]

Body

```

{
  "transactionId" : "string",
  "data" :
  {
    "contactRole" : "string",
    "emailAddress" : "string",
    "phoneNumber" : "string",
    "notifications" :
    [
      {
        "minApprovedCapacity" : "number",
        "maxApprovedCapacity" : "number",
        "approvalRequired" : "Boolean"
      }
    ],
    "inverterSettings" :
    [
      {
        "minimumCapacity" : "number",
        "maximumCapacity" : "number",
        "details" :
        {
          "sustainOpOvervoltLimit" : "number",
          "stopAtOverFrequency" : "number",
          "stopAtUnderFrequency" : "number",
          "inverterVoltWattResponseMode" :
            "string",
          "inverterWattResponseV1" : "number",
          "inverterWattResponseV2" : "number",
          "inverterWattResponseV3" : "number",
          "inverterWattResponseV4" : "number",
          "inverterWattResponsePatV1" : "number",
          "inverterWattResponsePatV2" : "number",
          "inverterWattResponsePatV3" : "number",
          "inverterWattResponsePatV4" : "number",
          "inverterVoltVarResponseMode" :
            "string",
          "inverterVarResponseV1" : "number",
          "inverterVarResponseV2" : "number",
          "inverterVarResponseV3" : "number",
          "inverterVarResponseV4" : "number",
          "inverterVarResponseQatV1" : "number",
          "inverterVarResponseQatV2" : "number",
          "inverterVarResponseQatV3" : "number",
          "inverterVarResponseQatV4" : "number",
          "inverterReactivePowerMode" : "string",
          "inverterFixedReactivePower" :
            "number",
          "fixedPowerFactorMode" : "string",

```

```

    "fixedPowerFactor" : "number",
    "fixedPowerFactorQuadrant" : "string",
    "powerResponseMode" : "string",
    "referencePointP1" : "number",
    "referencePointP2" : "number",
    "powerFactorAtP1" : "number",
    "powerFactorQuadrantAtP1" : "string",
    "powerFactorAtP2" : "number",
    "powerFactorQuadrantAtP2" : "string",
    "powerRateLimitMode" : "string",
    "powerRampRate" : "number"
  }
}
]
}

```

Field	Type	Description	Comments
contactRole	string(10)	Role of NSP individual in charge of the connection process	Those fields will appear on account-holders screen. They are used by account-holders to contact NSP when there is a query about connection process
emailAddress	string(50)	Email of NSP	
phoneNumber	string(15)	Phone number of NSP	
Notifications			
minApprovedCapacity	number(8, 3)	Minimum approved capacity in kVA Permitted range is between 0 and 30,000	User shall be able to provide a range of values with the preferred settings. Ranges should not overlap.
maxApprovedCapacity	number(8, 3)	Maximum approved capacity in kVA Permitted range is between 0 and 30,000	

approvalRequired	string(3)	To indicate if NSP requires approving a submission that was done by Account-holders	<p>Permitted value is either yes or no.</p> <p>If approvalRequired = yes, AC Connections and DER Devices within the specified range shall be "Conditional" until NSPs approve them.</p> <p>If approvalRequired = no, AC Connections and DER Devices within the specified range shall be "Confirmed" if they passed validations.</p> <p>If ranges are not provided, the default value shall be false, i.e. submissions by installers shall not require NSP's approval</p>
Inverter Settings			
minimumCapacity	number(8, 3)	Minimum inverter capacity in kVA	User shall be able to provide a range of values with the preferred inverter settings.
maximumCapacity	number(8, 3)	Maximum inverter capacity in kVA	<p>Ranges should not overlap.</p> <p>Providing inverter settings values will auto populate them in the event of using the DER Register web interface.</p> <p>This will speed up compiling inverter data and minimise data entry errors.</p>
sustainOpOvervoltageLimit	number(7, 3)	Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the $V_{nom-max}$. The unit is in (V)	
stopAtOverFreq	number(4, 2)	Frequency (stop). In Hz Permitted range is between 51 and 52 (inclusive)	
stopAtUnderFreq	number(4, 2)	Frequency (stop). In Hz Permitted range is between 47 and 49 (inclusive)	

invVoltWattRespMode	string(15)	This mode is described in AS4777.2:2015, section 6.3.2.1.	This mode is described in AS4777.2:2015, section 6.3.2.1. Permitted Value is one of the following: <ul style="list-style-type: none"> Enabled Not Enabled
invWattRespV1	number(7, 3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	These settings are described in AS4777.2:2015, section 6.3.2.1.
invWattRespV2	number(7, 3)	Unit is in (V). Permitted range is between 216 and 230 (inclusive)	
invWattRespV3	number(7, 3)	Permitted range is between 235 and 255 (inclusive)	
invWattRespV4	number(7, 3)	Unit is in (V). Permitted range is between 244 and 265 (inclusive)	
invWattRespPAtV1	number(6, 3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAtV2	number(6, 3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAtV3	number(6, 3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAtV4	number(6, 3)	Unit is in (%) Permitted range is between 0 and 20 (inclusive)	
invVoltVarRespMode	string(15)		This mode is described in AS4777.2:2015, section 6.3.2.1. Permitted Value is one of the following: <ul style="list-style-type: none"> Enabled Not Enabled
invVarRespV1	number(7, 3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	This mode is described in AS4777.2:2015, section 6.3.2.1.

invVarRespV2	number(7, 3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespV3	number(7, 3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespV4	number(7, 3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespQAtV1	number(6, 3)	Unit is in (%) Permitted range is between 0 and 60 (inclusive)	
invVarRespQAtV2	number(6, 3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	
invVarRespQAtV3	number(6, 3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive). -ve sign refers to "sink"	
invVarRespQAtV4	number(6, 3)	Unit is in (%) Permitted range is between -60 and 0 (inclusive) -ve sign refers to "sink".	
invReactivePowerMode	string(15)	Select which power quality response modes are enabled on the inverter.	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>
invFixReactivePower	number(6, 3)	Reactive Power. Specified in % output of the system. Permitted range is between -100 and 100 (inclusive). -ve sign refers to "sink"	

fixPowerFactor Mode	string(15)	Select which power quality response modes are enabled on the inverter	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> Enabled Not Enabled <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>
fixPowerFactor	number(4, 3)		Permitted range is between 0.8 and 1 (inclusive)
fixPowerFactor Quad	string(10)		<p>Permitted Value is one of the following:</p> <p>Source</p> <p>Sink</p>
powerRespMode	string(15)	Select which power quality response modes are enabled on the inverter.	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> Enabled Not Enabled <p>It should = "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>
referencePointP1	number(6, 3)	Unit is in (%)	The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installation.
referencePointP2	number(6, 3)	Unit is in (%)	
powerFactorAtP1	number(4, 3)	Permitted range is between 0.9 and 1 (inclusive)	
powerFactorQuadAtP1	string(10)	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> Source Sink 	
powerFactorAtP2	number(4, 3)	Permitted range is between 0.9 and 1 (inclusive)	
powerFactorQuadAtP2	string(10)	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> Source Sink 	

powerRateLimit Mode	string(15)	Select which power quality response modes are enabled on the inverter.	This mode is described in AS4777.2:2015, section 6.3.5.3.3. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled
powerRampRate	number(6, 3)	Unit is WGra, The power rate limit range shall be adjustable in the range of 5% - 100% of rated power per minute	As described in AS4777.2:2015, section 6.3.5.1.

4.7 POST getReceipts

4.7.1 Description

This API is used by participants to get a list of all receipts associated with single or multiple DER Records based on the supplied filter(s). The returned file size is to be confirmed.

4.7.2 Request

Item	Value
URL Path	/getReceipts
Method	POST
Header	Standard request header attributes, be sure to include: Authorization: Basic Content-Encoding: Should be one of [gzip, deflate, compress] Accept-Encoding: Should be one or more of [gzip, deflate, compress]
Body	<pre>{ "data" : { "modifiedDateFrom" : "string", "modifiedDateTo" : "string", "jobReferences" : [{ "nmi" : "string", "jobNumber" : "string", "installerId" : "string", "required": ["nmi", "jobNumber"] }] } }</pre>

Field	Type	Option	Description	Comments
modifiedDateFrom	string (YYYY-MM-DDTHH:mm:ss.sssZ)	O	From update date for a DER Record	This is not applicable to account holders. Only NSPs can use this
modifiedDateTo	string (YYYY-MM-DDTHH:mm:ss.sssZ)	O	To update date for a DER Record	This is not applicable to account holders. Only NSPs can use this
jobReferences				
nmi	string(10)	M	Unique identifier for each connection point where DER installation has been installed/approved	
jobNumber	string(30)	M	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	Specified by the NSP. This number will be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
installerId	string(50)	M	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).

4.7.3 Valid Submission Response

Item	Value
Response Code	200

Header

Standard response header attributes:

Content-Type: application/json

Content-Encoding: As requested [gzip, compress, deflate]

Body

```
{
  "transactionId" : "string",
  "data" :
  {
    "receipts" :
    [
      {
        "nmi" : "string",
        "jobNumber" : "string",
        "disclaimer" : "string",
        "derJobCompleteDate" : "string",
        "installerId" : "string",
        "approvedCapacity": "number",
        "confirmationLengthTime" : "number",
        "centralProtectionControl" : "string",
        "acConnections" :
        [
          {
            "connectionId" : "number",
            "equipmentType" : "string",
            "installedCapacity": "number",
            "manufacturerName" : "string",
            "modelName" : "string"
          }
        ],
        "devices" :
        [
          {
            "deviceId" : "number",
            "type" : "string",
            "installedCapacity": "number",
            "manufacturerName" : "string",
            "modelName" : "string"
          }
        ]
      }
    ]
  },
  "warnings":
  [
    {
      "code": "string",
      "title": "string",
      "detail": "string",
      "source": "string"
    }
  ]
}
```

Field	Applies When	Type	Description	Comments
nmi		string(10)	Unique identifier for each connection point where DER installation has been installed/approved.	
jobNumber		string(30)	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	This identifier is specified by the NSP as per their connection process. This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
disclaimer		string	Standard disclaimer information provided to Account-holders after submitting DER record details.	Only returned to Account-holders. For NSPs, this is returned as null.
derJobComplete Date		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when all AC Connections and DER Devices for a certain job become "Confirmed". It is the date that receipt is generated.	System generated value. Format in (YYYY-MM-DDTHH:mm:ss.sssZ)
installerId		string(50)	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).

approvedCapacity		number(8,3)	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Can be distinct or equal to an export limitation. Permitted range is between 0 and 30,000.
confirmationLengthTime		number(6,3)	The time of how long it took a job to be confirmed since records were active	The number of business days between derJobCompleteDate and the last commissioningDate/recordCommissioningDate for a DER Record during a certain job.
centralProtectionControl		string(3)	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Used to describe the type(s) of central protection to be applied to the DER system. Permitted value is one of the following: Yes No
acConnections				
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	This is system generated by AEMO.
equipmentType		string(20)	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted value is one of the following: Inverter Other
installedCapacity	If EquipmentType = Inverter	number(8,3)	The total capacity of inverter that are installed during a certain job	It is a calculated value. It represents what is the total inverter capacity that is physically installed at site for a certain job number
manufacturerName				Only returned to account-holders. For NSPs, this is returned as null
modelName				Only returned to account-holders. For NSPs, this is returned as null

devices				
deviceId	number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO.</p> <p>Permitted value is either:</p> <ul style="list-style-type: none"> • Null; or • an existing deviceId that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceId is none of the above.</p> <p>Null shall be used in the event of adding a new record.</p> <p>Existing deviceId will be used for updating an existing record</p>	
type	string(50)	Used to indicate the primary technology used in the DER device.	<p>Expected Value is one of the following:</p> <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other <p>Other values might be returned depends on the submitted Device "type".</p>	
installedCapacity	number(8,3)	The total capacity of DER Devices installed during a job	It is a calculated value. It represents what is the total device capacity that is physically installed at site for a certain job number.	
manufacturerName			Only returned to account-holders. For NSPs, this is returned as null	
modelName			Only returned to account-holders. For NSPs, this is returned as null	

4.8 POST getDER

4.8.1 Description

This API is used by participants to get a complete history of versions for a single DER Record. The returned file size is to be confirmed.

Note: This API returns all AC connections and DER devices, regardless of their status.

4.8.2 Request

Item	Value
URL Path	/getDER
Method	POST
Header	Standard request header attributes, be sure to include: Authorization: Basic Content-Encoding: Should be one of [gzip, deflate, compress] Accept-Encoding: Should be one or more of [gzip, deflate, compress]
Body	<pre> { "data" : { "derRecords" : [{ "nmi" : "string", "jobNumber" : "string", "required": ["nmi"] }] } }</pre>

Field	Type	Option	Description	Comments
nmi	string(10)	M	Unique identifier for each connection point where DER installation has been installed/approved	The user shall be able to pass only one NMI

jobNumber	string(0 30)	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	<p>This identifier is specified by the NSP as per their connection process.</p> <p>This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.</p>
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4.8.3 Valid Submission Response

Item	Value
Response Code	200
Header	<p>Standard response header attributes:</p> <p>Content-Type: application/json</p> <p>Content-Encoding: As requested [gzip, compress, deflate]</p>
Body	<pre>{ "transactionId" : "string", "data" : { "derRecords" : [{ "nmi" : "string", "jobNumber" : "string", "recordUpdateDate" : "string", "approvedCapacity": "number", "availablePhasesCount" : "number", "installedPhasesCount": "number", "islandableInstallation" : "string", "centralProtectionControl" : "string", "exportLimitkva" : "number", "underFrequencyProtection" : "number", "underFrequencyProtectionDelay" : "number", "overFrequencyProtection" : "number", "overFrequencyProtectionDelay" : "number", "underVoltageProtection" : "number", "underVoltageProtectionDelay" : "number", "overVoltageProtection" : "number", "overVoltageProtectionDelay" : "number", "sustainedOverVoltage" : "number", "sustainedOverVoltageDelay" : "number", "frequencyRateOfChange" : "number", "voltageVectorShift" : "number", "interTripScheme" : "string", "neutralVoltageDisplacement" : "number", "installerId" : "string", "submitterId" : "string", "submitterClass" : "string", </pre>

```

    "submitMode" : "string",
    "accessRequested" : "boolean",
    "comments" : "string",
    "acConnections":
    [
      {
        "connectionId" : "number",
        "nspConnectionId" : "string",
        "recordCreationDate" : "string",
        "recordUpdateDate" : "string",
        "recordConfirmedDate" : "string",
        "recordEndDate" : "string",
        "commissioningDate" : "string",
        "installationStage" : "string",
        "equipmentType" : "string",
        "cecConnectionId" : "string",
        "count" : "number",
        "statusCode" : "string",
        "frequencyRateOfChange" : "number",
        "voltageVectorShift" : "number",
        "interTripScheme" : "string",
        "neutralVoltageDisplacement" : "number",
        "details" :
        {
          "dredInverterInteraction" : "string",
          "serialNumbers" : ["string"],
          "manufacturerOther" : "boolean",
          "manufacturerName" : "string",
          "modelOther" : "boolean",
          "modelName" : "string",
          "inverterSeriesOther" : "boolean",
          "inverterSeries" : "string",
          "inverterStandard" : "string",
          "inverterDeviceCapacity" : "number",
          "sustainOpOvervoltLimit" : "number",
          "stopAtOverFreq" : "number",
          "stopAtUnderFreq" : "number",
          "invVoltWattRespMode" : "string",
          "invWattRespV1" : "number",
          "invWattRespV2" : "number",
          "invWattRespV3" : "number",
          "invWattRespV4" : "number",
          "invWattRespPAtV1" : "number",
          "invWattRespPAtV2" : "number",
          "invWattRespPAtV3" : "number",
          "invWattRespPAtV4" : "number",
          "invVoltVarRespMode" : "string",
          "invVarRespV1" : "number",
          "invVarRespV2" : "number",
          "invVarRespV3" : "number",
          "invVarRespV4" : "number",
          "invVarRespQAtV1" : "number",
          "invVarRespQAtV2" : "number",
          "invVarRespQAtV3" : "number",
          "invVarRespQAtV4" : "number",

```

```

"invReactivePowerMode" : "string",
"invFixReactivePower" : "number",
"fixPowerFactorMode" : "string",
"fixPowerFactor" : "number",
"fixPowerFactorQuad" : "string",
"powerRespMode" : "string",
"referencePointP1" : "number",
"referencePointP2" : "number",
"powerFactorAtP1" : "number",
"powerFactorQuadAtP1" : "string",
"powerFactorAtP2" : "number",
"powerFactorQuadAtP2" : "string",
"powerRateLimitMode" : "string",
"powerRampRate" : "number",
"reactivePowerRegulation" : "string",
"voltageSetPoint" : "number",
"voltageSetPointUnit" : "string",
"deadband" : "number",
"droop" : "number",
"baseForDroop" : "number",
"reactivePowerSourceLimit" : "number",
"reactivePowerSinkLimit" : "number",
"reactiveFixPowerFactor" : "number",
"reactiveFixPowerFactorQuad" : "string",
"generatorRampRate" : "number",
"powerRampGradient" : "number",
"frequencySensitiveMode" : "string",
"frequencyDeadband" : "number",
"frequencyDroop" : "number"
},
"devices" :
[
{
"deviceId" : "number",
"nspDeviceId" : "string",
"recordCreationDate" : "string",
"recordCommissioningDate" : "string",
"recordUpdateDate" : "string",
"recordConfirmedDate" : "string",
"recordEndDate" : "string",
"cecDeviceId" : "string",
"type" : "string",
"subType" : "string",
"count" : "number",
"status" : "string",
"installationStage" : "string",
"details" :
{
"typeOther" : "boolean",
"subTypeOther" : "boolean",
"manufacturerOther" : "boolean",
"manufacturerName" : "string",
"modelOther" : "boolean",
"modelName" : "string",
"nominalRatedCapacity" : "number",

```

```

        "nominalStorageCapacity" : "number"
      }
    }
  ],
  "exceptions" :
  [
    {
      "exceptionId" : "number",
      "code" : "number",
      "name" : "string",
      "affectedAttributes" : ["string"],
      "details" : "string",
      "status" : "string",
      "deviceId" : "number",
      "connectionId" : "number",
      "nspAcknowledged" : "string"
    }
  ]
},
"warnings":
[
  {
    "code": "string",
    "title": "string",
    "detail": "string",
    "source": "string"
  }
]
}

```

Field	Applies When	Type	Description	Comments
nmi	N/A	string(10)	Unique identifier for each connection point where DER installation has been installed/approved	

Field	Applies When	Type	Description	Comments
jobNumber	N/A	string(30)	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works	This identifier is specified by the NSP as per their connection process. This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.
recordUpdateDate	N/A	string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Record was updated.	AEMO will store a history of all versions changes and it can be tracked via this date. A new version is generated every time a new submission or update happens
approvedCapacity	N/A	number(8,3)	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Can be distinct or equal to an export limitation. Permitted range is between 0 and 30,000
availablePhasesCount	N/A	number(1)	The number of phases available for the installation of DER.	Permitted value is one of the following: <ul style="list-style-type: none"> • 1 • 2 • 3
installedPhasesCount	N/A	number(1)	The number of phases that DER is connected to.	Permitted value is one of the following: <ul style="list-style-type: none"> • 1 • 2 • 3
islandableInstallation	N/A	string(3)	For identification of small generating units designed with the ability to operate in an islanded mode.	Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No

Field	Applies When	Type	Description	Comments
centralProtectionControl	See 3.9.2, page 170.	string(3)	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Used to describe the type(s) of central protection to be applied to the DER system. Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
exportLimitkva	See 3.9.2, page 170.	number(8,3)	Export limit (kVA) Maximum amount of power (kVA) that may be exported from a connection point to the grid, as monitored by a control / relay function. A null value indicates no limit.	Permitted range is between 0 and 30,000
underFrequencyProtection	See 3.9.2, page 170.	number(4,2)	Under frequency protection in Hz	Permitted range is between 45 and 50 (inclusive)
underFrequencyProtectionDelay	See 3.9.2, page 170.	number(4,3)	Under frequency protection delay in seconds	
overFrequencyProtection	See 3.9.2, page 170.	number(4,2)	Over frequency protection in Hz	Permitted range is between 50 and 55 (inclusive)
overFrequencyProtectionDelay	See 3.9.2, page 170.	number(4,3)	Over frequency protection delay in seconds	
underVoltageProtection	See 3.9.2, page 170.	number(9,3)	Under voltage protection in volts (V)	
underVoltageProtectionDelay	See 3.9.2, page 170.	number(4,3)	Under voltage protection delay in seconds	
overVoltageProtection	See 3.9.2, page 170.	number(9,3)	Over voltage protection in volts (V)	

Field	Applies When	Type	Description	Comments
overVoltageProtectionDelay	See 3.9.2, page 170.	number(4,3)	Over voltage protection delay in seconds	
sustainedOverVoltage	See 3.9.2, page 170.	number(9,3)	Sustained Over voltage protection in volts (V)	
sustainedOverVoltageDelay	See 3.9.2, page 170.	number(5,3)	Sustained Over Voltage protection delay in seconds.	Permitted range is between 10 and 20 (inclusive).
frequencyRateOfChange	See 3.9.2, page 170.	number(4,3)	Rate of change of frequency trip point (Hz/s).	Permitted range is between 0 and 4 (inclusive)
voltageVectorShift	See 3.9.2, page 170.	number(4,2)	Trip angle (Deg)	
interTripScheme	See 3.9.2, page 170.	string(100)	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement	See 3.9.2, page 170.	number(7,3)	Trip voltage (V)	
installerId		string(50)	Unique identifier for the DER Account-holder accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	This identifier should be the Account-holder's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).
submitterId		string(50)	Records the userid that submitted this record	This is system generated by AEMO.
submitterClass		string(9)	Records the user classification whether it is NSP or others	Would be either "NSP" or "Installer"

Field	Applies When	Type	Description	Comments
submitMode		Varchar(6)		This attribute is NOT applicable to NSPs. It is to be used by Account-holders. Any submitted value by NSP shall be rejected. Permitted values is one of the following: - Save - Submit
accessRequested		Boolean		
comments		string(2000)	Comments to help with DER Submission.	This field shall help NSPs to write notes that help with the "Connection Process". These comments for NSP internal use only.
acConnections				
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	This is system generated by AEMO.
nspConnectionId		string(50)	An AC Connection identifier that is used by NSP internally	This is provided to assist participants with linking their internal ID with AEMO's generated connectionId
recordCreationDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record was created.	System generated and it is the date that the AC Connection gets submitted for the first time

Field	Applies When	Type	Description	Comments
recordConfirmedDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record becomes "Confirmed" for the first time	System generated. This date in combination with AC Connection commissioning date are needed to monitor / manage obligation on timeframe to complete submission of record.
recordEndDate		string (YYYY-MM-DDTHH:mm:ss.ssZ)	The date when AC Connection record ends or becomes decommissioned	System generated If DER Record is "Initial" or "Idle" and it is removed, this date will capture the removal date. If DER Record is "Conditional" or "Confirmed" and it is decommissioned, this date will capture the decommissioning date.
commissioningDate		string (YYYY-MM-DD)	The date that an AC Connection becomes "Active"	This date and AC Connection RecordConfirmedDate are needed to monitor / manage obligation on timeframe to complete submission of AC Connection. Commissioning date can be in the past, present or the future

Field	Applies When	Type	Description	Comments
installationStage		string(11)	Installation stage of the AC connection. This will be used to indicate to the user if the AC Connection is initial, conditional, confirmed, or idle. See 2.8, Installation stage.	Permitted value to be returned is one of the following: - Initial - Conditional - Confirmed - Idle
equipmentType		string(20)	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Permitted value is one of the following: - Inverter - Other
cecConnectionId		string(30)	Unique device identifier to store CEC inverter reference data	This ID shall be returned if the submitted inverter is accredited
count		number(5)	Number of AC Connections in the group. For the suite of AC Connections to be considered as a group, all the AC Connections included must have the same attributes.	

Field	Applies When	Type	Description	Comments
statusCode		string(20)	<p>Code used to indicate the status of the AC Connection. This will be used to identify if an AC Connection is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • Inactive • Active • Decommissioned 	<p>This status is only applicable on AC Connections. This is not a duplicate of the NMI level status, as inverters may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an AC Connection record that is created but that AC Connection is NOT physically installed or operating yet.</p> <p>Active: an AC Connection record that is physically installed and operating.</p> <p>Decommissioned: an AC Connection that used to operate, and it is NOT operating any more.</p>
frequencyRateOfChange		number(4,3)	<p>Rate of change of frequency (Hz/s)</p> <p>Permitted value is between 0 and 4 (inclusive)</p>	
voltageVectorShift		number(4,2)	Trip angle (Deg.)	
interTripScheme		string(100)	Description of the form of inter-trip (e.g. "from local substation").	
neutralVoltageDisplacement		number(7,3)	Trip voltage (V)	

Field	Applies When	Type	Description	Comments
dredInverterInteraction	If equipmentType = inverter	string(3)		Permitted value is one of the following: <ul style="list-style-type: none"> • Yes • No
serialNumbers		string(array)	The serial number of the device(s)	<p>If the equipment type = Inverter, the number of Serial Numbers (where entered) required must match the number of AC Connections.</p> <p>For example, if "count" = 3, then "serialNumbers" (where entered) must = 3.</p> <ul style="list-style-type: none"> • For NSP APIs, "serialNumbers" can be NULL. • For Account-holder APIs, "serialNumbers" must be entered and the above rule applies or the API will return an Exception 1021. <p>The maximum number of serial numbers permissible is 999.</p>
manufacturerOther		boolean	This is used to indicate if a manufacturer is accredited	Permitted value is one of the following: <ul style="list-style-type: none"> • true • false

Field	Applies When	Type	Description	Comments
manufacturerName	If equipmentType = inverter	string(120)	The name of the inverter manufacturer	Using DER Web, a list of accredited manufactures will be listed. If selected value = Other, the user needs to specify
modelOther		boolean	This is used to indicate if a model number is accredited	Permitted value is one of the following: <ul style="list-style-type: none"> true false
modelName		string(120)	The model number of the inverter.	Using DER Web, a list of accredited model numbers will be listed. If selected value = Other, the user needs to specify
inverterSeriesOther		boolean	This is used to indicate if an inverter series is accredited	Permitted value is one of the following: <ul style="list-style-type: none"> true false
inverterSeries		string(50)	The inverter series.	Using DER Web, a list of accredited model numbers will be listed. If selected value = Other, the user needs to specify

Field	Applies When	Type	Description	Comments
inverterStandard		string(100)	<p>What standard/s is the inverter manufactured, tested and installed to?</p> <p>Examples include AS4777.2:2015, IEC 62109-1 and IEC 62019-2.</p>	<p>Using DER web, if the selected "modelName" is accredited, this value will be auto-populated.</p> <p>If "modelName" is equal to "Other" This value will be entered manually.</p> <p>The auto-populated value is obtained from reference data</p>
inverterDeviceCapacity		number(9,3)	<p>The rated AC output power that is listed in the product specified by the manufacturer.</p> <p>This value refers to a single device.</p>	<p>Using DER web, if the selected "modelName" is accredited, this value will be auto-populated.</p> <p>If "modelName" is equal to "Other" This value will be entered manually.</p> <p>The auto-populated value is obtained from reference data</p>
sustainOpOvervolt Limit		number(7,3)	<p>Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the $V_{nom-max}$. The unit is in (V)</p>	<p>Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range.</p> <p>Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p>
stopAtOverFreq		number(4,2)	<p>Frequency (stop). In Hz</p> <p>Permitted range is between 51 and 52 (inclusive)</p>	

Field	Applies When	Type	Description	Comments
stopAtUnderFreq		number(4,2)	Frequency (stop). In Hz Permitted range is between 47 and 49 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them
invVoltWattRespMode	If equipmentType = inverter	string(15)	Permitted Value is one of the following: Permitted Value is one of the following: Enabled Not Enabled	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API.
invWattRespV1	If invVoltWattRespMode = Enabled	number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invWattRespV2		number(7,3)	Unit is in (V). Permitted range is between 216 and 230 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them
invWattRespV3		number(7,3)	Permitted range is between 235 and 255 (inclusive)	This mode is described in AS4777.2:2015, section 6.3.2.1.
invWattRespV4		number(7,3)	Unit is in (V). Permitted range is between 244 and 265 (inclusive)	
invWattRespPAV1		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAV2		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	
invWattRespPAV3		number(6,3)	Unit is in (%) Permitted range is between 0 and 100 (inclusive)	

Field	Applies When	Type	Description	Comments
invWattRespPAtV4		number(6,3)	Unit is in (%) Permitted range is between 0 and 20 (inclusive)	
invVoltVarRespMode	If equipmentType = inverter	string(15)	Permitted Value is one of the following: Enabled Not Enabled	
invVarRespV1	If invVoltVarRespMode = Enabled	number(7,3)	Unit is in (V) Permitted range is between 200 and 300 (inclusive)	
invVarRespV2		number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespV3		number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespV4		number(7,3)	Unit is in (V). Permitted range is between 200 and 300 (inclusive)	
invVarRespQAtV1		number(6,3)	Unit is in (%) Permitted range is between 0 and 60 (inclusive)	
invVarRespQAtV2		number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	

Field	Applies When	Type	Description	Comments
invVarRespQAtV3		number(6,3)	Unit is in (%) Permitted range is between -100 and 100 (inclusive) -ve sign refers to "sink"	
invVarRespQAtV4		number(6,3)	Unit is in (%) Permitted range is between -60 and 0 (inclusive) -ve sign refers to "sink".	
invReactivePower Mode	If equipmentType = inverter	string(15)	Select which power quality response modes are enabled on the inverter. Permitted Value is one of the following: <ul style="list-style-type: none"> • Enabled • Not Enabled It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.	
invFixReactivePower	If invReactivePowerMode = Enabled	number(6,3)	Reactive Power. Specified in % output of the system. Permitted range is between -100 and 100 (inclusive). -ve sign refers to "sink"	Using DER Web, these values will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on

Field	Applies When	Type	Description	Comments
fixPowerFactorMode	If equipmentType = inverter	string(15)	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled <p>It should equal to "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	<p>preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API , the user shall manually provide them</p>
fixPowerFactor	If fixPowerFactorMode = Enabled	number(4,3)	Permitted range is between 0.8 and 1 (inclusive)	
fixPowerFactorQuad		string(10)	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Source • Sink 	
powerRespMode	If equipmentType = inverter	string(15)	<p>Select which power quality response modes are enabled on the inverter.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled <p>It should = "Not Enabled", if InvVoltVarRespMode or/and InvVoltWattRespMode = Enabled.</p>	
referencePointP1	If powerResp	number(6,3)	Unit is in (%)	Using DER Web, these values will be auto-populated
referencePointP2		number(6,3)	Unit is in (%)	

Field	Applies When	Type	Description	Comments
powerFactorAtP1	Mode = Enabled	number(4,3)	Permitted range is between 0.9 and 1 (inclusive)	based on "Inverter Device Capacity" range.
powerFactorQuadAtP1		string(10)	Permitted Value is one of the following: Source Sink	Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API.
powerFactorAtP2		number(4,3)	Permitted range is between 0.9 and 1 (inclusive)	If no values provided in submitPreferences API , the user shall manually provide them
powerFactorQuadAtP2		string(10)	Permitted Value is one of the following: <ul style="list-style-type: none"> • Source • Sink 	The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installation.

Field	Applies When	Type	Description	Comments
powerRateLimitMode	If equipmentType = inverter	string(15)	Select which power quality response modes are enabled on the inverter.	<p>Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API</p> <p>If no values provided in submitPreferences API , the user shall manually provide them</p> <p>This mode is described in AS4777.2:2015, section 6.3.5.3.3.</p> <p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • Enabled • Not Enabled

Field	Applies When	Type	Description	Comments
powerRampRate	If powerRateLimitMode = Enabled	number(6,3)	Unit is W _{Gra} . The power rate limit range shall be adjustable in the range of 5 - 100 of rated power per minute	Using DER Web, this value will be auto-populated based on "Inverter Device Capacity" range. Auto-populated values are based on preferred NSP inverter settings values supplied in submitPreferences API If no values provided in submitPreferences API, the user shall manually provide them As described in AS4777.2:2015, section 6.3.5.1.
reactivePowerRegulation	If equipmentType = inverter	string(20)		Permitted Value is one of the following: <ul style="list-style-type: none"> • None • Voltage droop • Fixed power factor
voltageSetPoint	If reactivePowerRegulation = Voltage droop	number(9,3)	The set voltage point	Permitted Value is one of the following: <ul style="list-style-type: none"> • % • V
voltageSetPointUnit		string(1)	The unit for voltageSetPoint	
deadband		number(6,3)	± x%	
droop		number(5,3)	In %	
baseForDroop		number(8,3)	In kVA	
reactivePowerSourceLimit		number(8,3)	In Var	

Field	Applies When	Type	Description	Comments
reactivePowerSinkLimit		number(8,3)	In Var	
reactiveFixPowerFactor	If reactivePowerRegulation = Fixed power factor	number(4,3)		Permitted range is between 0 and 1 (inclusive)
reactiveFixPowerFactorQuad		string(10)		Permitted Value is one of the following: <ul style="list-style-type: none"> • Source • Sink
generatorRampRate	If equipmentType = inverter	string(15)		A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none"> - Enabled - Not Enabled
powerRampGradient	If generatorRampRate = Enabled	number(6,3)	Power ramp rate (%/min)	Permitted range is between 0 and 100 (inclusive)
frequencySensitiveMode	If equipmentType = inverter	string(15)		A generator may operate in a frequency sensitive mode whereby it adjusts output to help support frequency control. A generator may have a ramp rate applied. Permitted Value is one of the following: <ul style="list-style-type: none"> - Enabled - Not Enabled
frequencyDeadband	If frequencySensitiveMode = Enabled	number(6,3)	In Hz	
frequencyDroop		number(4,2)	In %	
devices				

Field	Applies When	Type	Description	Comments
deviceId		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	<p>This is system generated by AEMO. Permitted value is either:</p> <ul style="list-style-type: none"> • Null; or • an existing deviceId that has been previously generated by AEMO <p>AEMO's system will reject submission if deviceId is none of the above.</p> <p>Null shall be used in the event of adding a new record.</p> <p>Existing deviceId will be used for updating an existing record</p>
nspDeviceId		string(50)	A DER Device identifier that is used by NSP internally	This is provided to assist participants with linking their internal ID with AEMO's generated deviceId
recordCreationDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record was created.	
recordCommissioningDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record became active.	<p>This will either equal to: Commissioning date of the AC Connection linked to it, if they were created on the same date; OTHERWISE</p> <p>The date that the DER Device status becomes "Active"</p> <p>recordCommissioningDate can be in the past, or present</p>

Field	Applies When	Type	Description	Comments
recordConfirmedDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record became "Confirmed" for the first time	System generated. This date in combination with Device recordCommissioningDate are needed to monitor / manage obligation on timeframe to complete submission of record.
recordEndDate		string (YYYY-MM-DDTHH:mm:ss.sssZ)	The date when DER Device record ends/decommissioned.	System generated If DER Record is "Initial" or "Idle" and it is removed, this date will capture the removal date. If DER Record is "Conditional" or "Confirmed" and it is decommissioned, this date will capture the decommissioning date.
cecDeviceId		string(30)	Unique device identifier to store CEC Device reference data	This ID shall be returned if the submitted device is accredited

Field	Applies When	Type	Description	Comments
type		string(50)	Used to indicate the primary technology used in the DER device.	<p>Expected Value is one of the following:</p> <ul style="list-style-type: none"> - Co-/Tri-generation - Fossil - Geothermal - Hydro - Renewable/Biomass/Waste - Solar PV - Storage - Wind - Other <p>"Other" is only applicable in the web portal. Selecting "Other" will request the user to specify.</p> <p>Using API, it is accepted to submit a device type that is not in the list. There is no validation applied on this.</p>

subType		string(50)	Used to indicate the primary technology used in the DER device.	<p>This field is also used to record for example the battery chemistry, or the type of PV panel. It is also used to record if a battery is contained in an electric vehicle connected in a vehicle-to-grid arrangement.</p> <p>If Type = Solar PV, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Monocrystalline - Polycrystalline - Crystalline - Thin-film - Concentrating PV - Silicon - Biohybrid - Cadmium telluride - Other <p>If Type = Storage, the expected value is one of the following:</p> <ul style="list-style-type: none"> - Lithium-ion - Lead acid - Lead carbon - Sodium nickel - Lead crystal - Absorbed glass matt - Vanadium - Aqueous hybrid ion - Tubular gel - Zinc bromide - Electric Vehicle - Other <p>If Type != Solar PV or Storage, the permitted value is "Other"</p> <p>"Other" is only applicable in the web portal. Selecting "Other" will request the user to specify</p> <p>Using API, it is accepted to submit a device sub-type that is not in the list. There is no</p>
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Field	Applies When	Type	Description	Comments
				validation applied on this.
count		number(5)	Number of devices in the group of DER devices.	
status		string(20)	<p>Code used to indicate the status of the DER Device. This will be used to identify if a Device is active or inactive or decommissioned.</p> <p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> - Inactive - Active - Decommissioned 	<p>This status is only applicable on DER Device. This is not a duplicate of the NMI level status, as Devices may become active or inactive without a change of status to the overall system.</p> <p>Inactive: an DER Device record that is created but that DER Device is NOT physically installed or operating yet.</p> <p>Active: an DER Device record that is physically installed and operating.</p> <p>Decommissioned: an DER Device that used to operate, and it is NOT operating any more.</p>
installationStage		string(11)	<p>Installation stage of the DER Device.</p> <p>This will be used to indicate to the user if the DER Device is initial, conditional, confirmed, or idle.</p> <p>See 2.8, Installation stage.</p>	<p>Permitted value to be returned is one of the following:</p> <ul style="list-style-type: none"> - Initial - Conditional - Confirmed - Idle

Field	Applies When	Type	Description	Comments
typeOther	If type = Other	boolean	To indicate if the submitted device type is part of the provided list	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> - true - false <p>If the submitted device "type" is one of the list provided below, the returned value shall be false</p> <p>If the submitted device "type" is NOT one of the list provided below, the returned value shall be false</p>
subTypeOther	If subType = Other	boolean	To indicate if the submitted device subtype is part of the provided list	<p>Permitted Value is one of the following:</p> <ul style="list-style-type: none"> • true • false <p>If the submitted device "subType" is one of the list provided below, the returned value shall be false</p> <p>If the submitted device "subType" is NOT one of the list provided below, the returned value shall be true</p>
manufacturerOther		boolean	This is used to indicate if a manufacturer is accredited	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • true • false
manufacturerName		string(120)	The name of the device manufacturer	Definitions align to the approved modules list.
modelOther		boolean	This is used to indicate if a model number is accredited	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> • true • false
modelName		string(120)	The model number of the device.	Definitions align to the approved modules list.

Field	Applies When	Type	Description	Comments
nominalRatedCapacity		number(8,3)	Maximum output in kVA that is listed in the product specification by the manufacturer. This refers to the capacity of each unit within the device group.	Using DER web, if the selected "modelName" is accredited, this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually. The auto-populated value is obtained from reference data
nominalStorageCapacity	If Type = Storage	number(9,3)	Maximum storage capacity in kWh. This refers to the capacity of each storage module within the device group.	Using DER web, if the selected "modelName" is accredited, this value will be auto-populated. If "modelName" is equal to "Other" This value will be entered manually. The auto-populated value is obtained from reference data
exceptions				
exceptionId		number	A unique identification for an exception generated when business validation fails	This Id is integer value and will be generated by AEMO upon a submission that fails business validation Permitted value of submission is one of the following: an existing exceptionId that was previously generated by AEMO. Null If the ExceptionId was not generated by AEMO, the system will reject the submission.
code		number(4)	Code used to indicate the type of exception	

Field	Applies When	Type	Description	Comments
name		string(20)	Name of exception	
affectedAttributes		string(300)	Lists the names of fields that were the reason for producing this exception	
details		string(200)	Description of the exception	
status		string(6)	Status of exception (Open or closed)	Permitted values is one of the following: - Open - Closed
deviceId		number(15)	Unique identifier for a single DER device or a group of DER devices with the same attributes.	This is system generated by AEMO. Permitted value is either: - Null; or - an existing deviceId that has been previously generated by AEMO AEMO's system will reject submission if deviceId is none of the above. Null shall be used in the event of adding a new record. Existing deviceId will be used for updating an existing record

Field	Applies When	Type	Description	Comments
connectionId		number(15)	Unique identifier for each AC Connection or Group in a DER installation.	<p>This is system generated by AEMO. Permitted value is either:</p> <ul style="list-style-type: none"> - Null; or - an existing connectionId that has been previously generated by AEMO. <p>AEMO's system will reject submission if connectionId is none of the above.</p> <p>Null shall be used in the event of adding a new record.</p> <p>Existing connectionId will be used for updating an existing record.</p>
nspAcknowledged		string(3)	<p>This is used when there is an exception but the user acknowledges it without resolving/editing the exception.</p> <p>For example, if model number is not accredited, AEMO will generate an exception. The user will have the ability to acknowledge it and exception will be closed.</p>	<p>Permitted value is one of the following:</p> <ul style="list-style-type: none"> - Yes - No <p>Yes indicates that the user acknowledged the exception and record will become "Confirmed" (provided no other exceptions).</p> <p>No will do nothing to the exception and it will stay open.</p>

4.8.4 Invalid Submission Response

Item	Value
Scenario	365 days have elapsed after the job creation for the first time.
Response Code	422

Header	Standard response header attributes: Content-Type: application/json Content-Encoding: As requested [gzip, compress, deflate]
Body	<pre>{ "transactionId": "dfefef15-7b08-4d08-bae8- d9c73abb78e2", "errors": [{ "code": "422", "title": "Expired", "detail": "365 days have been passed after NSP submitting the job number for the first time. The job is permanently locked.", "source": "" }] }</pre>

Item	Value
Scenario	Account-holder/install access to the record is blocked by the NSP
Response Code	422
Header	Standard response header attributes: Content-Type: application/json Content-Encoding: As requested [gzip, compress, deflate]
Body	<pre>{ "transactionId": "dfefef15-7b08-4d08-bae8- d9c73abb78e2", "errors": [{ "code": "422", "title": "Blocked", "detail": "This record has been blocked explicitly by NSP. Please contact the NSP or Request Access", "source": "" }] }</pre>

Item	Value
Scenario	All device and connection records are confirmed.

Response Code	422
Header	Standard response header attributes: Content-Type: application/json Content-Encoding: As requested [gzip, compress, deflate]
Body	<pre>{ "transactionId": "dfefef15-7b08-4d08-bae8- d9c73abb78e2", "errors": [{ "code": "422", "title": "Confirmed", "detail": "This record has been confirmed. Please contact the NSP or Request Access.", "source": "" }] }</pre>

4.9 POST requestJobAccess

4.9.1 Description

This API is used by Account-holders to request access to a job on the DER web interface, using the NMI as an identifier.

4.9.2 Request

Item	Value
URL Path	/requestJobAccess
Method	POST
Header	Standard request header attributes, be sure to include: Authorization: Basic Content-Encoding: Should be one of [gzip, deflate, compress] Accept-Encoding: Should be one or more of [gzip, deflate, compress]
Body	<pre>{ "data" : { "nmi" : "string", "jobNumber" : "string" }, "required": ["nmi", "jobNumber"] }</pre>

Field	Type	Option	Description	Comments
nmi	string(10)	M	Unique identifier for each connection point where DER installation has been installed/approved	
jobNumber	string(30)	M	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	This identifier is specified by the NSP as per their connection process. This number shall be used by Account-holders in combination with an NMI to access a DER Record in AEMO's register.

4.9.3 Valid Submission Response

Item	Value
Response Code	200
Header	Standard response header attributes: Content-Type: application/json Content-Encoding: As requested [gzip, compress, deflate]
Body	<pre>{ "transactionId" : "string", "data" : }</pre>
Example	<pre>{ "transactionId": "4dfa3ca1-6cd7-4067-b526-f9989866b305", "data": null }</pre>

4.10 GET logout

4.10.1 Description

This API invalidates the current user session and redirects the user to the login page. That is, it logs the user out.

4.10.2 Request

Item	Value
URL Path	/logout
Method	GET
Example	GET /logout?accessToken={accessToken}&clientId={clientId}&idToken={idToken}&redirectURL={redirectURL}

Field	Type	Option	Description	Comments
access_token	string(28)	M	Access token from the /requestAccessToken or /refreshAccessToken response after the user logged in.	See POST requestAccessToken and POST refreshAccessToken.
clientId	String	M	client key associated with the registered App	
idToken	String	M	Id Token from the /requestAccessToken response	See POST requestAccessToken
redirectURL	String	M	URL where the user is redirected to after successful logout	

4.10.3 Valid Submission Response

Item	Value
Response Code	200

4.10.4 Invalid Submission Response

Item	Value
Response Code	401

4.11 Validation Rules

4.11.1 First Validation: DER Pre-Submission

Business Rules	Impacted Field(s)-	Applies to	Exception Code
Content must be in the correct format.	All	Account-holder and NSP	1020
All mandatory fields are completed.	Mandatory Fields	Account-holder and NSP	1021

NMI must have at least one AC Connection linked to it.	N/A	Account-holder and NSP	1030
Each AC Connection with status of null, "Active" or "Inactive" must have at least one Device linked to it.	N/A	Account-holder and NSP	1031
Each Device with status of null, "Active" or "Inactive" must have an AC Connection linked to it.	N/A	Account-holder and NSP	1032
<p>If there is an existing "Confirmed" AC Connection or DER Device and status = Active, it must be included in every submission, i.e. Confirmed AC Connections or DER Devices cannot be removed.</p> <p>If "Confirmed" DER Record is decommissioned, status changes to "Decommissioned" and must be submitted.</p>	N/A	Account-holder and NSP	1040
<p>If there is an existing "Confirmed" AC Connection or DER Device and status = Active, it must be included in every submission, i.e. Conditional DER Records cannot be removed</p> <p>If "Conditional" DER Record is decommissioned, status changes to "Decommissioned" and must be submitted</p>	N/A	Account-holder and NSP	1041
AC Connection ID must be null or generated previously by AEMO.	connectionId	Account-holder and NSP	1050
DER Device ID must be null or generated previously by AEMO.	deviceId	Account-holder and NSP	1051
AC Connection status must be null or "Inactive" if commissioning date is null or in the future.	AC Connection statusCode	Account-holder and NSP	1060
AC Connection status must be "Active" or "Decommissioned" if commissioning date is in the present or in the past.	AC Connection statusCode	Account-holder and NSP	1061

Device Status must be null or "Inactive" if the AC Connection linked to it has status of null or "Inactive".	Device status	Account-holder and NSP	1062
Device Status must be "Decommissioned" if the AC Connection linked to it has status of "Decommissioned".	Device Status	Account-holder and NSP	1063
AC Connection status cannot be "Inactive" if it was previously Active or Decommissioned	AC Connection statusCode	Account-holder and NSP	1064
DER Device status must NOT be Inactive if it was previously Active or Decommissioned.	Device status	Account-holder and NSP	1065
Number values must be within the permitted range. These ranges are specified in the tables in Section 7.	number fields	Account-holder and NSP	1070
Device Type must be Solar, Storage, or Wind if the AC Connection linked to it = Inverter.	type	Account-holder and NSP	1080
Device Type must be NOT Solar, Storage, or Wind if the AC Connection linked to it = Other.	type	Account-holder and NSP	1081
The count of submitted Serial numbers for an AC Connection must equal to the number of AC Connections.	serialNumbers	Account-holder and NSP	1090
Each Active AC Connection must have "number of AC Connection" equal to or less than total of "number of DER Devices" that are linked to it, i.e. number of AC Connections <= SUM {number of Devices 1 + number of Devices 2 ... + number of Devices n} Where n is the number of Devices or group of DER Devices connected to that AC Connection This validation is only applicable if AC Equipment Type = Inverter.	AC Connection count	Account-holder and NSP	1110

If AC Equipment Type = Other, then "number of AC Connection" must equal to "number of DER Devices" linked to it.	AC Connection count	Account-holder and NSP	1111
One of Protection or Control Modes attributes must be submitted.	The following Level 1 (NMI Level) fields: exportLimitkva" , "underFrequencyProtection", "underFrequencyProtectionDelay", "overFrequencyProtection", "overFrequencyProtectionDelay", "underVoltageProtection", "underVoltageProtectionDelay", "overVoltageProtection", "overVoltageProtectionDelay", "sustainedOverVoltage", "sustainedOverVoltageDelay", "frequencyRateOfChange", "voltageVectorShift", "interTripScheme", "neutralVoltageDisplacement"	Account-holder and NSP	1120
Reactive power mode must be "Not Enabled" if any of Voltage response modes are Enabled.	invReactivePowerMode	Account-holder and NSP	1121
Fixed power factor mode MUST be "Not Enabled" if any of Voltage response modes are Enabled.	fixPowerFactorMode	Account-holder and NSP	1122
Power factor curve / power response mode MUST be "Not Enabled" if any of Voltage response modes are Enabled.	powerRespMode	Account-holder and NSP	1123
If export limit is specified, it must be equal or smaller than approved capacity.	exportLimitkva	Account-holder and NSP	1130
If "Voltage set point unit" is %, then "Voltage set point" must NOT be more than 100.	voltageSetPoint	Account-holder and NSP	1140
Account-holders must not submit an equipment type that was not part of the Connection Agreement Parameters submitted by NSP.	AC equipmentType Device Type	Account-holder	1150

Account-holders must NOT edit "Non-Editable" fields at any point. Refer to submitDER for non-editable fields for Account-holders	"Non-Editable" attributes	Account-holder	1170
Account-holders must NOT edit commissioning dates for AC Connections that were created with previous job numbers	commissioningDate	Account-holder	1171

4.11.2 Second Validation: DER Pre-Submission

Business Rules	Impacted Field(s)-	Applies to	Exception Code	Comments
NSP must be notified if the Approved Capacity for an NMI is in the range that this NSP specified to approve for	approvedCapacity	Account-holder	2020	
Account-holders must not edit pre-populated AC Connection attributes that were submitted by NSP	AC Connection Attributes	Account-holder	2021	
Account-holders must not edit pre-populated DER Devices attributes that were submitted by NSP	Device Attributes	Account-holder	2022	
NSP must be notified if optional fields are not submitted by Account-holders	Optional Attributes	NSP and Account-holder	2023	
				NSPs cannot acknowledge this exception.

Business Rules	Impacted Field(s)-	Applies to	Exception Code	Comments
If no export limit is specified, approved capacity must be equal or bigger than AC Connection installed Capacity	approvedCapacity	Account-holder and NSP	2040	<p>AC Connection Installed capacity is a calculated value. It represents what is the total capacity physically installed at site.</p> <p>Exceptions generated due to this validation rule cannot be acknowledged.</p> <p>All AC Connections and DER Devices that were newly added will be "Conditional". Refer to "DER Process Update"</p>

5. Error codes

Error code	Error message
1120	1120 - Invalid submission Missing information. At least one field must be completed.
1130	1130 - Invalid submission Export limit exceeds approved capacity.
1030	1030 - Invalid submission DER installation information missing. Please link an AC Connection to this NMI.
1031	1031 - Invalid submission DER installation information missing. Please link a Device to this AC Connection.
1050	1050 - Invalid submission Invalid AC Connection identifier.
1051	1051 - Invalid submission Invalid Device identifier.
1062	1062 - Invalid submission Device status not aligned to linked AC Connection.
1063	1063 - Invalid submission Device status not aligned to linked AC Connection.
1080	1080 - Invalid submission Device type invalid for AC Connection type.
1081	1081 - Invalid submission Device type invalid for AC Connection type.
1065	1065 - Invalid submission Device status invalid.
1040	1040 - Invalid submission DER Record mismatch to AEMO data.
1041	1041 - Invalid submission DER Record mismatch to AEMO data.
1070	1070 - Invalid submission Value not approved by NSP.
1060	1060 - Invalid submission DER installation not yet commissioned.
1061	1061 - Invalid submission DER installation already commissioned. Status must be active or decommissioned.
1090	1090 - Invalid submission Missing information.
1110	1110 - Invalid submission Not enough Devices in DER Record.
1111	1111 - Invalid submission Number of Devices and AC Connections must match.
1064	1064 - Invalid submission AC Connection status invalid.

1140	1140 - Invalid submission Value is percentage, maximum is 100%.
1121	1121 - Invalid submission Cannot enable reactive power AND voltage response modes.
1122	1122 - Invalid submission Cannot enable fixed power factor AND voltage response modes.
1123	1123 - Invalid submission Cannot enable variable power factor AND voltage response modes.
1150	1150 - Invalid submission Equipment type not approved by NSP.
1170	1170 - Invalid submission NSP-approved information has been edited.
1171	1171 - Invalid submission NSP-approved information has been edited.
3000	3000 - NMI must exist in DER register database.
3001	3001 - Job Number must exist in DER register database.
3002	3002 - Combination of Job Number and NMI must be correct i.e Job number is associated with the submitted NMI in connection agreement submission.
1160	1160 - Invalid submission Default standards capacity ranges already in use.
1161	1161 - Invalid submission Approved capacity ranges already in use.
1000	1000 - Invalid submission: Job number already in use.
1010	1010 - Invalid submission: NMI does not exist in MSATS.
1011	1011 - Invalid submission: NMI is Extinct and cannot be used.
1012	1012 - Invalid submission: NMI not aligned to NSP NMI allocation

6. Glossary

Term	Explanation
Account-holder	Any person (non-NSP) holding an account with AEMO that allows access to the DER Register under controlled access conditions. This may be a DER installer or someone acting on behalf of a DER installer.
AEMO	Australian Energy Market Operator
DER	Distributed Energy Resources
DERR	Distributed Energy Resources Register
MSATS	Market Settlement and Transfer Solution for retail electricity
NEM	National Electricity Market
NMI	National Metering Identifier