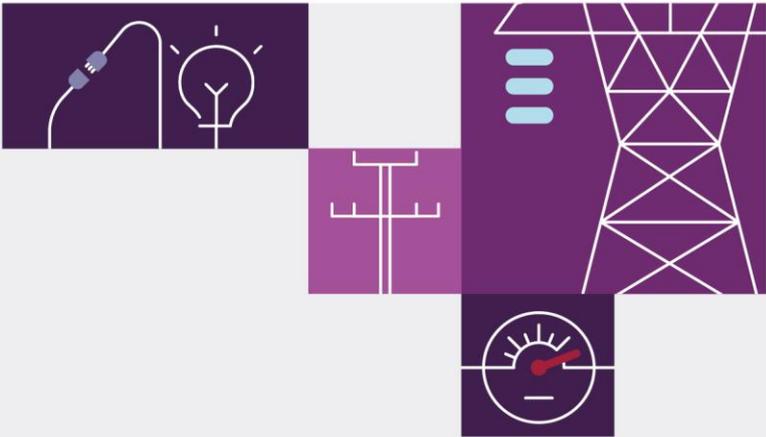# WEM Distributed Energy Resource (DER) Register Technical Specification

October 2023

V2.00

Important notice

Purpose

This WEM: Distributed Energy Resource (DER) Register Technical Specification, prepared by the Australian Energy Market Operator (AEMO), provides guidance for submitting and managing DER Generation Information to the WEM DER Register under the WEM (Rules).

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Distribution

Available to the public.

In accordance with the WEM Procedure: Distributed Energy Resource (DER) Register Information AEMO publishes this document on the WEM website.

Document identification

IT custodian: Manager, Retail solutions
Prepared by: AEMO
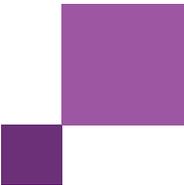Last update: 28/09/2023 10:12:00 AMThursday, 28 September 2023 10:12 AM

Version history

2.00 – 2 October 2023 – Amendments resulting from **Procedure Change AEPC_2022_02**
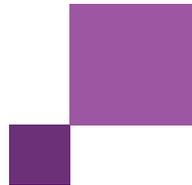1.00 – 10 February 2021

Feedback

Your feedback is important and helps us improve our services and products. To suggest improvements, please contact AEMO's Support Hub.

Contents

1 Introduction

The Distributed Energy Resource Register is an AEMO database to be used by Network Operators in the Wholesale Electricity Market (WEM) to electronically register and maintain DER Generation Information via AEMO's Application Programming Interface (API). DER Generation Information is submitted to the DER Register using AEMO's WEM NMI API and WEM DER Installation.

1.1 Purpose and scope

In accordance with the WEM Procedure: Distributed Energy Resource (DER) Register Information (Procedure), this document provides information about:

- Registering with AEMO to use the APIs.

- Accessing and using the APIs to submit, update, and retrieve DER Generation Information.

- Error and exception notifications to be reviewed and resolved by the relevant Network Operator.

1.2 Audience

- The primary audience is Network Operators in the WEM.

- The secondary audience is AEMO Operations and Technology teams.

1.3 Assumed knowledge

It is assumed you have knowledge of:

- RESTful programming architecture
- **WEM Procedure: Distributed Energy Resource (DER) Register Information**

2 Need to Know

2.1 Definitions

Terms defined in the WEM Procedure: Distributed Energy Resource (DER) Register Information have the same meanings and should be read in conjunction with this document.

Abbreviations and their descriptions which apply in this document are outlined in the **Glossary**.

2.2 Interpretation

The following interpretations apply to this document unless the context requires otherwise:

- The WEM Procedure: Distributed Energy Resource (DER) Register Information prevails over this document to the extent of any inconsistency.

- References to time are references to Australian Western Standard Time.

- Words expressed in the singular include the plural and vice versa.

- References to a paragraph refers to a paragraph of the WEM Procedure: Distributed Energy Resource (DER) Register Information.

- Section references applies to a section within this document.

- Examples provided in this document contain data that is intended for illustrative purposes only.

2.3 Schedule

The release is scheduled for implementation on 2 October 2023. This document supersedes previous versions.

2.4 Related information

- **AEMO | WEM Procedures**

- **AEMO | DER data dashboard WA**

- **AEMO | DER Register Reference Information**
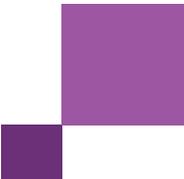
- **WEM DER NMI - AEMO APIs**

- **WEM DER Installation - AEMO APIs**

- **oAuth - AEMO APIs**

- **API Developer Portal FAQs.**

2.5　Finding help

2.5.1　Support Hub

IT assistance is requested through one of the following methods:
- Phone: 1300 AEMO 00 (1300 236 600)

- **Contact us form** on AEMO's website

AEMO recommends contacting AEMO's Support Hub for all urgent issues.

2.5.2　Information to provide

Please provide the following information when requesting IT assistance from AEMO:
- Your name and Job Title

- Email and Phone Number

- Organisation name

- Participant ID

- System or application name

- Environment: production or pre-production

- Problem description

- Screenshots

2.5.2　Feedback

Your feedback is important and helps us improve our services and products. To suggest improvements, please contact AEMO's Support Hub.

3   About the DER Register

The DER Register is an AEMO database which contains the DER Generation Information AEMO receives from Network Operators in accordance with the WEM Procedure: Distributed Energy Resource (DER) Register Information[1].

The DER Register data model consists of a three-level database structure shown in the figure below.

A DER Installation is identified by the NMI (Level 1 DER Installation Data) and has one or more AC Connections (Level 2 AC Connection Data). An AC Connection has one or more DER Devices (Level 3 DER Device Data) associated via the AC Connection ID.

For further details on the data model, see Appendix A in the **WEM Procedure: Distributed Energy Resource (DER) Register Information.**

Figure 1   The DER Register data model level.
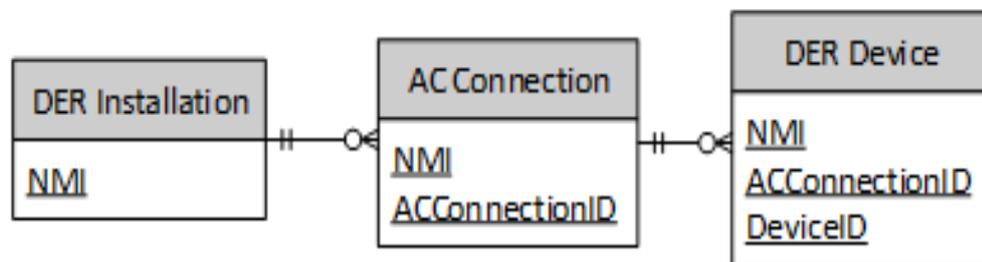
3.1   How to use the DER Register

Submit and manage DER Generation Information using three APIs:

- **OAuth API**– Requesting an OAuth access token to access the WEM DER NMI and WEM DERDE Installation APIs.

- **WEM DER NMI API** – Creating, updating, and retrieving NMI records.

- **WEM DER Installation API** – Creating, updating, and retrieving DER Installation records.

4 WEM DER Register Access

To access AEMO's APIs, complete the following requirements described in Table 1.

Table 1   WEM DER Register access requirements

Requirement	Description
API Portal	**AEMO's API Portal** contains technical information describing the AEMO DER Register APIs. This includes **OpenAPI specification** files and links to **Postman collections**..
	Production: **https://dev.aemo.com.au/**
	Pre-production: https://dev.preprod.aemo.com.au
	AEMO's API Portal contains technical information describing the AEMO DER Register APIs.
API key and secret	An API key and secret is required to generate an OAuth token for authorising API requests.
Obtain a TLS Certificate	API connections use mTLS certificates issued by AEMO to secure the transport layer with encrypted communication.
	AEMO mTLS certificates are self-managed by participants.
	Network Operators connect to the AEMO DER Register APIs using a TLS connection. Authentication is via one-way SSL.
	For details, see **TLS Certificate Management.**
Create an OAuth token	Use the **OAuth API** and provide the API key and secret to generate an OAuth token. The token is used for authenticating API requests. See **Creating an OAuth token**.

4.1   Creating an OAuth token

The OAuth token is used to authorise WEM DER NMI and WEM DER Installation API requests.

An OAuth token is generated with AEMO OAuth API. When making a token request, include the base64-encoded Client Id and Client Secret in the authorisation header:

Example: OAuth token

```
curl --location --request POST
'https://api.aemo.com.au/oauth/v1/token?grant_type=client_crede
ntials' --header 'Authorization: Basic
aXdNT0V1R3gyVlJBWWswaFR4dmhJTjhvd2hXQ3hHSkg6SU1UNGdtSVpwWDFFPVkE
0bA=='
```
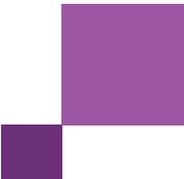
Example: A successful request returns a 200 HTTP status code in the response with the access token and the expiry.

```
{
    "transactionID": "120fda78-2894-44b3-a880-8204a98b637f",
    "access_token": "<access token string>",
    "expires_in": 3599
}
```

For more details, see the **OAuth API** in the **API Portal.**

5 Using the WEM DER Register

AEMO's APIs is the communication method to exchange DER Generation Information. To create, update and retrieve DER Generation Information, the Network Operator develops and maintains its own systems to call on the APIs. For access, see **WEM DER Register access**.

5.1 API validation levels

For WEM DER NMI API and WEM DER Installation API requests, there are several validation levels to ensure data is correctly submitted to the WEM DER Register:

- WEM DER NMI API: Two validation levels – JSON schema validation and first level validations.

- WEM DER Installation API: Three validation levels – JSON schema validation, first level validations and second level validations.

5.1.1 JSON schema validation

When an API request is received, AEMO's system validates the JSON request payload. If the JSON fails validation, a 400 HTTP response status code is returned. In some circumstances, a 400 or 1020 JSON error code is also returned in the response with details of the error.

Note:

- **Appendix A: WEM NMI API submission data fields** and **WEM DER Installation API submission data fields** provides information on data fields that return the 1020 JSON error code, refer to the table column JSON Schema Validation Error Code.

- **Appendix C: Validation Errors** describes the validations associated with 400 and 1020 JSON error codes and how to resolve validation.

- For information on HTTP response status codes, see **HTTP Response Status Codes**.

Example: A 400 HTTP status code is returned in the response with one JSON schema validation error code 400 "BadRequest".

```
{
    "errors": [
        {
            "code": "400",
            "title": "BadRequest",
            "detail": "The JSON value could not be converted to
System.Nullable`1[System.Int64]. Path:
$.data.acConnections[0].devices[0].deviceId | LineNumber: 113 |
BytePositionInLine: 34.",
            "source": null
        }
    ],
    "transactionId": "34506102-042f-4562-bbbd-3220cbf42f3d"
}
```

Example: A 400 **HTTP Response Status Codes** is returned in the response with two
JSON Validation Errors codes 1020.

```
{
    "transactionId": "3de65a57-e1d3-4a94-9619-d4aab5424bdb",
    "data": {},
    "errors": [
        {
            "code": 1020,
            "title": "request.body.status",
            "detail": "is not one of enum values:
Active,Extinct",
            "source": null
        },
        {
            "code": 1020,
            "title": "request.body",
            "detail": "requires property \"tni\"",
            "source": null
        }
    ]
}
```

5.1.2   First level validation

First level validation checks the data submitted for a create or update API call is valid
according to the validation rules.

If the request passes the first level validations, the API returns a 200 or 201 status
response code. The change is accepted to the DER Register database.

If the request fails first level validation, the API returns a 422 status response code.
first level validation errors are displayed with an error code in the range of 1000 to

1999 in the "code" field and the "detail" field with exception details. The request is rejected and no change is made to the data in the WEM DER Register database.

Note:

- **Appendix A: WEM NMI API submission data fields** and **WEM DER Installation API submission data fields** provides information on the data fields impacted by first level validation errors.

- **Appendix C First Level Validation Errors** outlines describes the validations associated with first level validation errors.

Example: Create NMI API response with two first level validation error codes 1014 and 1020.

```
{
  "transactionId": "b33a779c-f73f-423d-bceb-6fb0576f1e47",
  "errors": [
      {
          "code": "1014",
          "title": "postcode",
          "detail": "Invalid postcode: Not located in Western
Australia. postCode must be between 6000 and 6999",
          "source": null
      },
      {
          "code": "1020",
          "title": "nmi",
          "detail": "Invalid submission: NMI already
exists.",
          "source": null
      }
  ]
}
```

5.1.3   Second level validation

Second level validation is applied to the WEM DER Installation API when creating or updating an existing DER Register record. It occurs after the request has passed the first level validation and the API returns a 200 or 201 successful response status code.

If the submission fails a second level validation, the data is accepted in the DER Register, but one or more exceptions are created and the installation stage is set to Conditional.

In the API response, second level validation exceptions are listed in the exceptions array with a 2023, 2024 or 2040 exception codes and details of the exception, as shown in the example below.

Note:

- **Appendix C: Validation Errors** provides further information on exception codes.

- The sections below define the concepts of Confirmed and Conditional DER Register Records.

- For clarity, second level validations exceptions do not apply to the WEM DER NMI API.

Example: A **Create DER Installation record** API response with multiple second level validation 2023 exception codes.

```
{
    "data": {
        "exceptions": [
            {"exceptionId": 104032,
                "code": "2023",
                "title": "installerId",
                "detail": "Review Data: Data not provided (must
 have a value).",
                "recordCreationDate": "2023-09-
18T10:04:38.084+08:00",
                "recordUpdateDate": "2023-09-
18T10:04:38.084+08:00"
            },
            {
                "exceptionId": 104033,
                "connectionId": 200000006518711,
                "code": "2023",
                "title": "nspConnectionId",
                "detail": "Review Data: Data not provided (must
 have a value).",
                "recordCreationDate": "2023-09-
18T10:04:38.084+08:00",
                "recordUpdateDate": "2023-09-
18T10:04:38.084+08:00"
            },
            {
                "exceptionId": 104034,
                "connectionId": 200000006518711,
                "code": "2023",
                "title": "equipmentInjectionCapacity",
                "detail": "Review Data: Data not provided (must
 have a value where the associated DER Equipment Type is one of
```

```
: Hybrid Inverter, Battery Storage Inverter, EVSE V2G, Rotating Mach
ine, Solar PV Inverter, Inverter)",
                "recordCreationDate": "2023-09-
18T10:04:38.084+08:00",
                "recordUpdateDate": "2023-09-
18T10:04:38.084+08:00"
            },
            {
                "exceptionId": 104035,
                "connectionId": 200000006518711,
                "code": "2023",
                "title": "serialNumbers",
                "detail": "Missing Information (Cannot contain
blank serials).",
                "recordCreationDate": "2023-09-
18T10:04:38.084+08:00",
                "recordUpdateDate": "2023-09-
18T10:04:38.084+08:00"
            },
            {
                "exceptionId": 104036,
                "connectionId": 200000006518711,
                "code": "2023",
                "title": "manufacturerName",
                "detail": "Review Data: must have a value when s
tatus is Active.",
                "recordCreationDate": "2023-09-
18T10:04:38.084+08:00",
                "recordUpdateDate": "2023-09-
18T10:04:38.084+08:00"
            },
            {
                "exceptionId": 104037,
                "connectionId": 200000006518711,
                "code": "2023",
                "title": "modelNumber",
                "detail": "Review Data: must have a value when s
tatus is Active.",
                "recordCreationDate": "2023-09-
18T10:04:38.084+08:00",
                "recordUpdateDate": "2023-09-
18T10:04:38.084+08:00"
            },
            {
                "exceptionId": 104038,
                "connectionId": 200000006518711,
                "code": "2023",
                "title": "equipmentSeries",
                "detail": "Review Data: must have a value when
status is Active.",
                "recordCreationDate": "2023-09-
18T10:04:38.084+08:00",
                "recordUpdateDate": "2023-09-
18T10:04:38.084+08:00"
```

```
            },

            },
            {
                "exceptionId": 104039,
                "connectionId": 200000006518711,
                "code": "2023",
                "title": "equipmentStandard",
                "detail": "Review Data: must have a value when
status is Active.",
                "recordCreationDate": "2023-09-
18T10:04:38.084+08:00",
                "recordUpdateDate": "2023-09-
18T10:04:38.084+08:00"
            },
            {
                "exceptionId": 104040,
                "connectionId": 200000006518711,
                "code": "2023",
                "title": "sustainOpOvervoltLimit",
                "detail": "Review Data: Data Not Provided (Must
 be provided where Region Setting is not applied (where DER Equ
ipment Type is one of: Battery Storage Inverter, Hybrid Inverte
r, Solar PV Inverter).",
                "recordCreationDate": "2023-09-
18T10:04:38.084+08:00",
                "recordUpdateDate": "2023-09-
18T10:04:38.084+08:00"
```

A created or updated DER record displays the second level validation status for each Installation, AC Connection and Device in the installationStage field – Confirmed if there's no exceptions, or Conditional if there are exceptions to be resolved.

Example: A partial JSON response for a **Create DER Installation record** API response displaying a Confirmed installation stage at the installation, AC connection and device details.

```json
{
    "data": {
        "exceptions": [],
        "nmi": "10 digits",
        "jobNumber": "Job Number",
        "installationStage": "Confirmed",
        "recordConfirmedDate": "2023-09-13T13:40:19.611+08:00",
        "approvedCapacity": 10,
        "loadCapacity": 0,
        "exportLimitkW": 0,
        "importLimitKw": 0,
        "availablePhasesCount": 1,
        "installedPhasesCount": 1,
        "islandableInstallation": "No",
        "centralProtectionControl": "No",
        "installerId": "123456789",
        "comments": "comments",
        "acConnections": [
            {
                "connectionId": 200000006518642,
                "installationStage": "Confirmed",
                "recordConfirmedDate": "2023-09-13T13:40:19.611+08:00",
                "nspConnectionId": "nspConnectionId",
                "commissioningDate": "2023-10-11",
                "equipmentType": "Solar PV Inverter",
                "count": 1,
                "status": "Active",
                "equipmentInjectionCapacity": 10,
                "equipmentWithdrawalCapacity": 0,
                "details": {
                    "serialNumbers": [
                        "123456789"
                    ],
                    "manufacturerName": "Manufacturer name",
                    "modelNumber": "Model Number",
                    "equipmentSeries": "Equipment Series",
                    "equipmentStandard": "AS/NZS.4777.2:2020",
                    "regionSetting": "B",
                    "additionalRequirements": "None"
                },
                "devices": [
                    {
                        "deviceId": 200000006583990,
                        "installationStage": "Confirmed",
                        "recordConfirmedDate": "2023-09-12T08:40:23.318+08:00",
                        "nspDeviceId": "nspDeviceId",
                        "type": "Solar PV",
                        "comments": "Device Comments",
                        "count": 48,
                        "status": "Active",
                        "details": {
```

```
                                        "manufacturerName": "Manufacturer
name",

                                        "modelNumber": "Model Number",
                                        "nominalRatedCapacity": 0.25,
                                        "nominalLoadCapacity": 0,
                                        "nominalStorageCapacity": 0
                                },
                                "recordCreationDate": "2023-09-
13T13:40:19.611+08:00",

                                "recordUpdateDate": "2023-09-
13T13:40:19.611+08:00"
                        }
                ],
```

The data fields impacted by second level validation exceptions are listed in **Appendix A: WEM DER Installation API submission data fields,** column 'Second Level Validation Exception Code – Conditional Installation Stage.

5.2　Installation stages - confirmed and conditional records

DER Connection and Device records in the WEM DER Register includes an "installationStage" field to indicate if the record is Confirmed or Conditional.

The installation stage is provided in the response when creating a DER installation record, updating a DER installation record, or retrieving an installation record. A DER Installation can have many associated AC Connections and Devices with a Confirmed or Conditional installation stage.

5.2.1　Confirmed records

A DER record is assigned with an installation stage of 'Confirmed' when the DER record has passed all validations checks. The DER Generation Information is submitted to the DER Register.

Example: A partial JSON response which shows a Confirmed installation stage at the AC Connection and Device levels and a Conditional installation stage at the Installation level. Data provided is for illustrative purposes.

```
{
    "data": {

        "exceptions": [

            {

                "exceptionId": 103153,
                "code": "2040",
                "title": "loadCapacity",
                "detail": "Review Data: Installed withdrawal
capacity greater than load capacity.",
                "recordCreationDate": "2023-09-
13T13:41:42.958+08:00",
                "recordUpdateDate": "2023-09-
13T13:41:42.958+08:00"
            }
        ],
        "nmi": "10 digits",
        "jobNumber": "Job Number",
        "installationStage": "Conditional",
        "approvedCapacity": 12,
        "loadCapacity": 0,
        "exportLimitkW": 0,
        "importLimitKw": 0,
        "availablePhasesCount": 1,
        "installedPhasesCount": 1,
        "islandableInstallation": "Yes",
        "centralProtectionControl": "No",
        "installerId": "123456789",
        "comments": "comments",
        "acConnections": [
            {
                "connectionId": 200000006518643,
                "installationStage": "Confirmed",
                "recordConfirmedDate": "2023-09-
13T13:41:42.958+08:00",
                "nspConnectionId": "nspConnectionId",
                "commissioningDate": "2023-10-11",
                "equipmentType": "Solar PV Inverter",
                "count": 1,
                "status": "Active",
                "equipmentInjectionCapacity": 6,
                "equipmentWithdrawalCapacity": 0,
                "details": {
                    "serialNumbers": [
                        "123456789"
                    ],
                    "manufacturerName": "Manufacturer name",
                    "modelNumber": "Model Number",
                    "equipmentSeries": "Equipment Series",
                    "equipmentStandard": "AS/NZS.4777.2:2020",
                    "regionSetting": "B",
                    "additionalRequirements": "None"
```

```
                    },
                    "devices": [
                        {
                            "deviceId": 200000006583991,
                            "installationStage": "Confirmed",
                            "recordConfirmedDate": "2023-09-
12T08:39:53.496+08:00",
                            "nspDeviceId": "nspDeviceId",
                            "type": "Solar PV",
                            "comments": "Device Comments",
                            "count": 30,
                            "status": "Active",
                            "details": {
                                "manufacturerName": "Manufacturer
name",
                                "modelNumber": "Model Number",

                                "nominalRatedCapacity": 0.25,
                                "nominalLoadCapacity": 0,
                                "nominalStorageCapacity": 0
                            },
                            "recordCreationDate": "2023-09-
13T13:41:42.958+08:00",
                            "recordUpdateDate": "2023-09-
13T13:41:42.958+08:00"
                        }
                    ],
                    "recordCreationDate": "2023-09-
13T13:41:42.958+08:00",
                    "recordUpdateDate": "2023-09-
13T13:41:42.958+08:00"
                },
                {
                    "connectionId": 200000006518644,
                    "installationStage": "Confirmed",
                    "recordConfirmedDate": "2023-09-
13T13:41:42.958+08:00",
                    "nspConnectionId": "nspConnectionId",
                    "commissioningDate": "2023-10-11",
                    "equipmentType": "Battery Storage Inverter",
                    "count": 1,
                    "status": "Active",
                    "equipmentInjectionCapacity": 6,
                    "equipmentWithdrawalCapacity": 6,
                    "details": {
                        "serialNumbers": [
                            "123456789"
                        ],
                        "manufacturerName": "Manufacturer name",
                        "modelNumber": "Model Number",
                        "equipmentSeries": "Equipment Series",
                        "equipmentStandard": "AS/NZS.4777.2:2020",
                        "regionSetting": "B",
                        "additionalRequirements": "None"
```

```
                },
                "devices": [
                    {
                        "deviceId": 200000006583992,
                        "installationStage": "Confirmed",
                        "recordConfirmedDate": "2023-09-
12T08:39:53.496+08:00",
                        "nspDeviceId": "nspDeviceId",
                        "type": "Storage",
                        "comments": "Device Comments",
                        "count": 1,
                        "status": "Active",
                        "details": {
                            "manufacturerName": "Manufacturer
name",
                            "modelNumber": "Model Number",
                            "nominalRatedCapacity": 6,
                            "nominalLoadCapacity": 6,
                            "nominalStorageCapacity": 13
                        },

                        "recordCreationDate": "2023-09-
13T13:41:42.958+08:00",
                        "recordUpdateDate": "2023-09-
13T13:41:42.958+08:00"
                    }
                ],
                "recordCreationDate": "2023-09-
13T13:41:42.958+08:00",
                "recordUpdateDate": "2023-09-
13T13:41:42.958+08:00"
            }
        ],
        "recordCreationDate": "2023-09-13T13:41:42.958+08:00",
        "recordUpdateDate": "2023-09-13T13:41:42.958+08:00"
    }
}
```

5.2.2 Conditional records

A record is assigned with a Conditional installation stage when second level validation exceptions have occurred at the Installation, AC Connection or Device levels for data submitted with the **Create DER Installation record** API or the Update a DER installation record API endpoints. The API response provides details of the exception code and the field attribute in the title.

- For details of second level validation exceptions, see **Appendix C : Second Level Validation Exceptions**

- For details of the data fields which can result in a DER record being in a 'Conditional' status see **Appendix A: WEM DER Installation API submission**

data fields, column 'Second Level Validation Exception Code – Conditional Installation Stage.

Example: A partial JSON response for a Create DER Installation record API request with an installation stage of 'Confirmed' at the Installation and an installation stage of 'Conditional' for the AC connection and Device. Two second level validation exceptions codes 2023 and 2024 are returned in the response.

```
{
    "data": {
        "exceptions": [
            {"data": [
            {
                            "exceptionId": 88026,
                            "code": 2024,
                            "title": "equipmentWithdrawalCapacity",
                            "detail": "Review data: The Equipment
Withdrawal Capacity has been provided as 0 (Where DER Equipment
Type is one of Hybrid Inverter, Battery Storage Inverter, EVSE V2G,
EVSE no V2G, Controllable Load)
                            ]
                },
                {
                            "exceptionId": 88027,
                            "connectionId": 200000006574332,
                            "deviceId': 200000006574332,
                            "code": 2023,
                            "title": "equipmentSeries",
                            "detail": "Review data: must have a
value when status is Active.",

                "installationStage": "Confirmed",
                "recordConfirmedDate": "2023-10-
23T11:55:01.000+8:00",
...
            "acConnections": [
            {
                "connectionId": 200000006512398,
                "installationStage": "Conditional",
                "commissioningDate": "2023-10-11",
...
                "devices": [
                    {
                        "deviceId": 200000006574332,
                        "installationStage": "Conditional",
                        "details": {
                         },
```

5.3   Creating a DER Register record

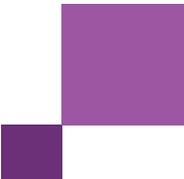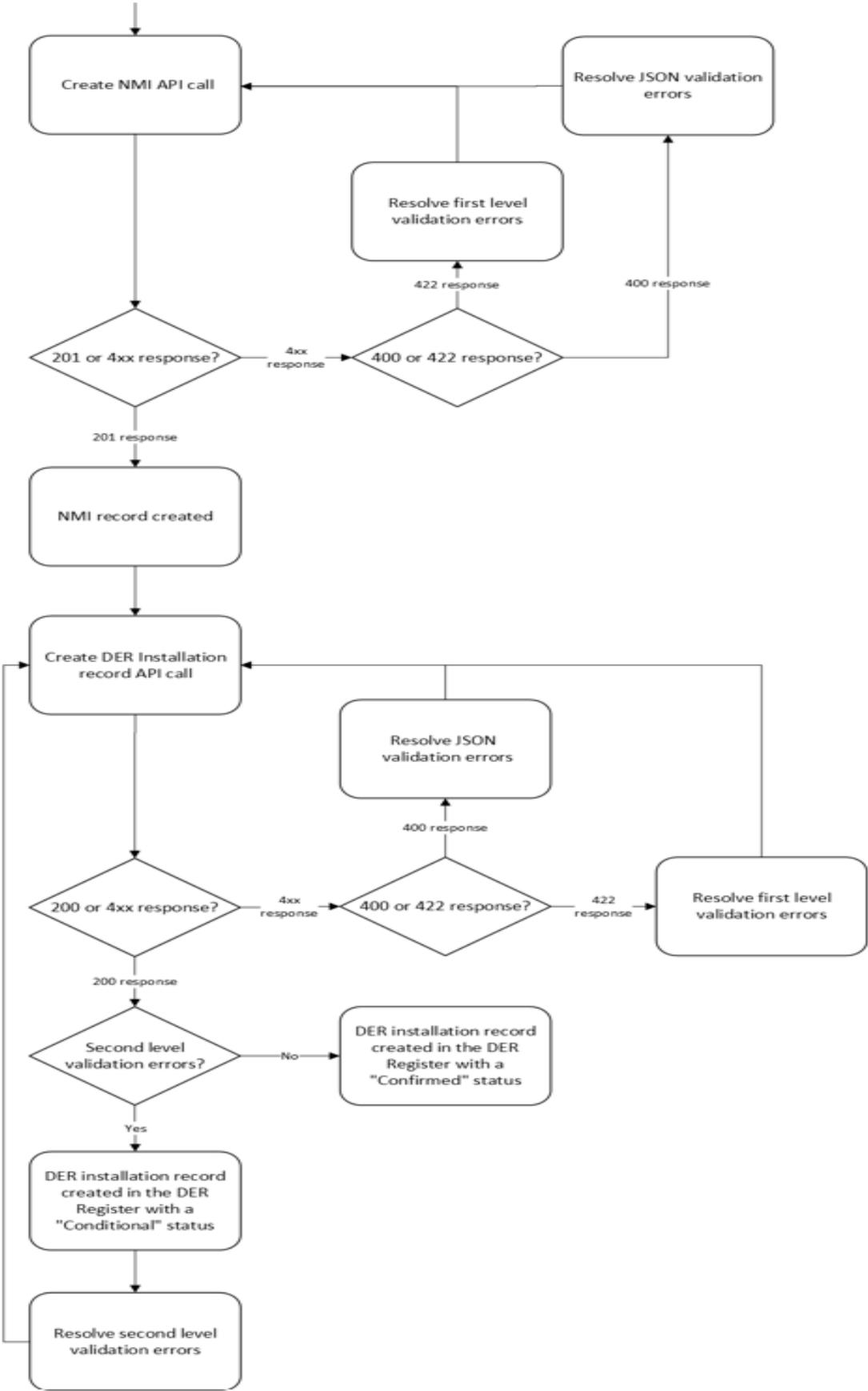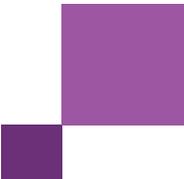A DER record is created in the DER Register for the first time by submitting two API requests:

- **Create NMI record** API request using the WEM DER NMI API

- **Create Installation record** API request with DER installation information to create the installation, ac connection and device for the respective NMI.

Figure 2   Creating a DER Register record.

To create an installation record in the DER Register:

1. Make a **Create NMI** API (POST) request using the WEM DER NMI API. See **Create NMI** in the **API Portal** and **Appendix A: WEM NMI API submission data fields** which outlines the data fields to be submitted to the DER Register.

2. Review the response status code:

- A 201 HTTP response status code indicates a successful request and the NMI record is created. Proceed to step 4.

- A 400 HTTP response status code indicates JSON validation exceptions have occurred. A 1020 error code may also be returned with details of the specific exceptions. Validate the data attributes included in the exception message. For help, see **Appendix C: JSON Validation Errors** Proceed to step 3.

- A 422 HTTP response status code indicates first level validation exceptions. Validate the data attributes included in the exception message. For help, see **Appendix C First Level Validation Errors**. Proceed to step 3.

3. Resubmit the data with valid data attributes in a **Create NMI** API (POST) request and return to step 2.

4. Make a **Create DER Installation record** API request using the WEM DER Installation API. See **Create DER Installation record** which outlines the data fields and the permitted values to be submitted. See **Appendix A: WEM DER Installation API submission data details** which outlines the data fields to be submitted to the DER Register.

5. Check the status code in the response:

- A 422 HTTP response status code indicates first level validation exceptions. Validate the data 'attributes' included in the exception message and re-submit with valid attributes in a **Create DER Installation record** API (POST) call. For further details see **Appendix C First Level Validation Errors.**

- Where a 201 HTTP response status code is returned:

  − Store the AEMO-provided Connection and Device Ids. These are required to update the created DER records in the future.

  − Review the response to identify any second level validation errors. Validate the data 'attributes' included in the exception message and re-submit **Create DER Installation record** API (POST) with valid attributes until there are no errors shown in the response. The DER record remains in a **Conditional status** until all errors are resolved**.** For further details, see **Second level validation exceptions**

- As described in Section 5 **Validation Levels**, second level validation exceptions occur when errors are found in the created or updated DER Installation submission payload record according to validations applied to a specific data field. The exception code, exception message included as 'detail' and field 'attribute' in the title are included in the API response.

For further information on HTTP response status codes see **HTTP Response Status Codes**.

5.4   Updating a NMI record

The **Update NMI details** endpoint is used to update an existing NMI record in the DER Register. For example, when the NMI status changes from active to extinct or the TNI or NMI Zone Substation information changes.

Figure 3   Update an NMI record process
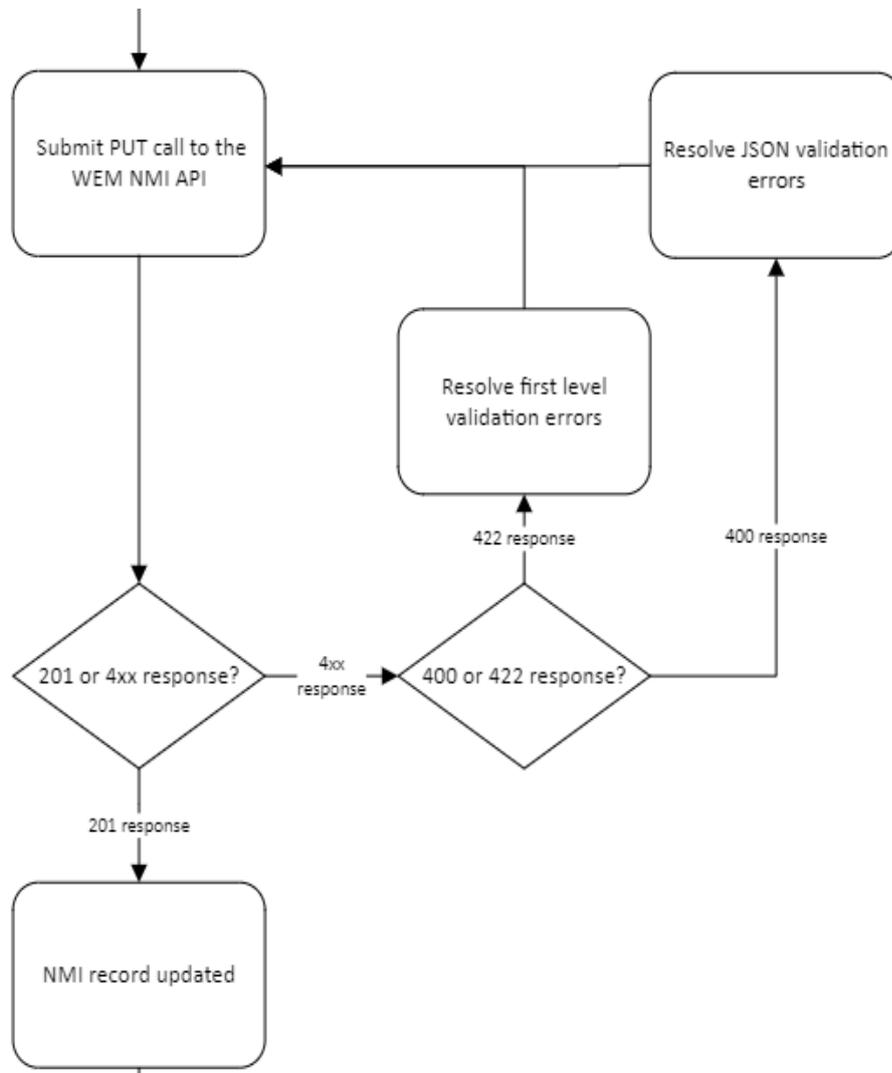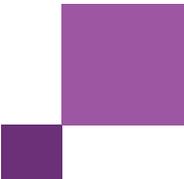
To update an existing NMI record in the DER Register:

1. Submit a **Update NMI details** API request. See **WEM DER NMI API** in the **API Portal** and **Appendix A: WEM NMI API submission data fields** which outlines the data fields and the permitted values to be submitted to the DER Register. All data fields are mandatory to provide as part of the update DER NMI API (PUT).

2. Review the response status code:

- A 201 HTTP response status code is indicates a successful request and the NMI record is created.

- A 400 HTTP response status code is indicates JSON validation errors have occurred. A 1020 error code may also be returned with details of the specific error. Validate the data attributes included in the exception message. For further details see **Appendix C: JSON Validation Errors**. Proceed to step 3.

- A 422 HTTP response status code indicates first level validation errors. Validate the data attributes included in the exception message. For help, see **Appendix C First Level Validation Errors**. Proceed to step 3.

3. Resubmit the data with valid data attributes in a **Update NMI details** API request. Return to step 2.

5.5   Updating a DER installation record

The **Update DER installation record** endpoint:

- updates an existing DER Installation record in the DER Register for the respective NMI at the installation, AC connection and Device level. For example, where DER Equipment and or DER Devices are no longer active and the AC Connection status and the DER Device status changes from 'Active' to 'Decommissioned' or where changes are made to the approved DER generation capacity if additional DER equipment is approved for connection by the Network Operator.

- adds new AC Connections, DER Equipment and DER Device information to an existing DER Installation record.

- updates details of all active AC Connections and DER Devices existing in the DER Register.

When updating a DER Installation Record where not all active AC Connections and or active DER Devices is submitted, a 1040 error code is returned.

For example, if there are two existing and active AC Connections and DER Devices associated with the NMI in the DER Register, both AC Connections and Devices must

be provided even if changes are not required to one of the AC Connections. See
Appendix C First Level Validation Errors.

Figure 4   Updating a DER Installation record.
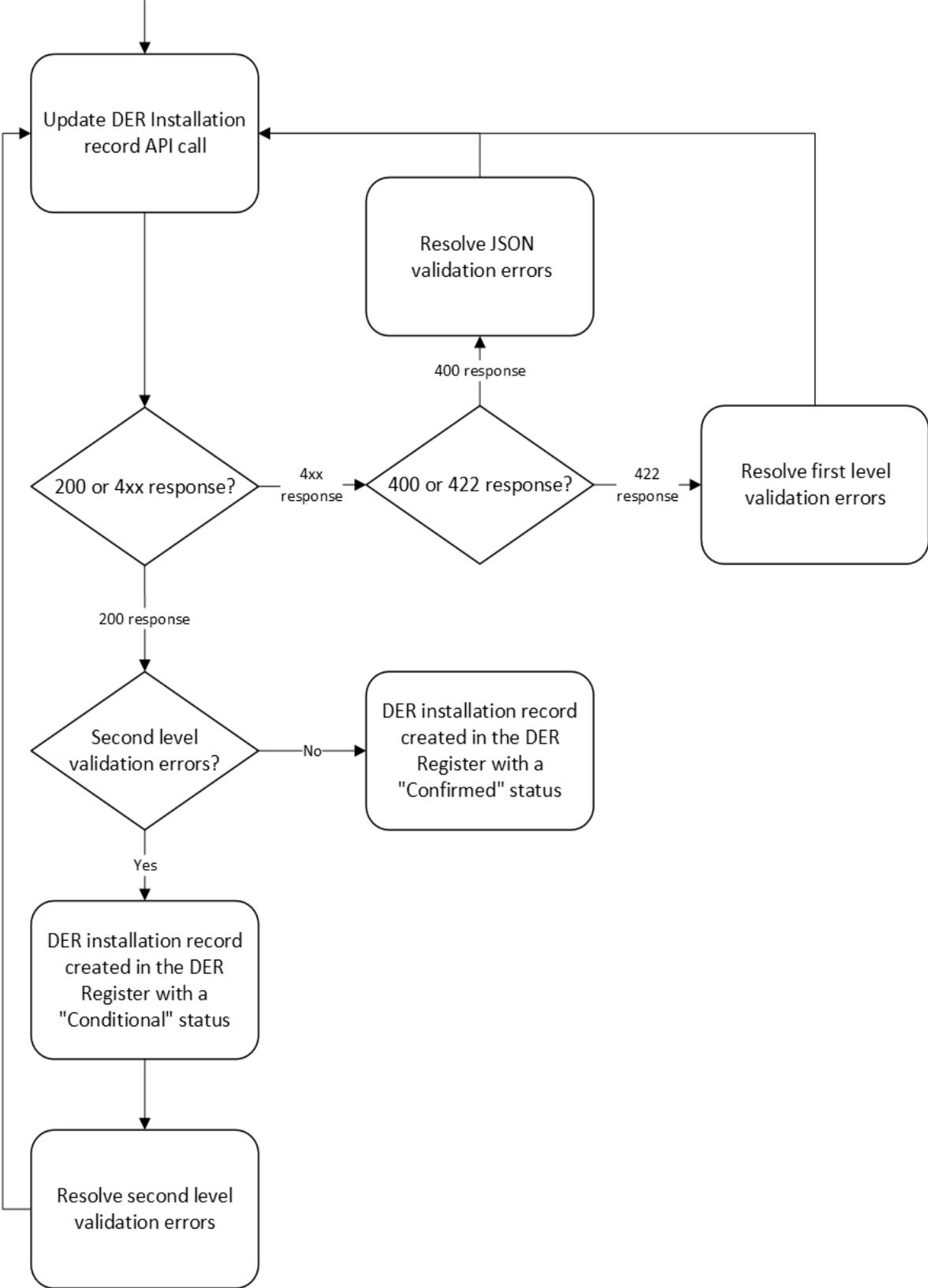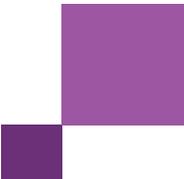
To update an existing DER Installation:

1. Submit a **Update DER installation record** API request with the updated data in the payload. See **Appendix A: WEM DER Installation API submission data fields** which describes the data fields and the permitted values to be submitted to the DER. The same acConnectionId and deviceId provided by AEMO when the initial create DER Installation API submission API was successfully created are to be provided to update the existing AC Connection and device record details.

2. Check the status code in the response:

- A 200 HTTP response status code indicates a successful call and the DER Installation record is updated. Proceed to step 4.

- A 400 HTTP response status code indicates JSON validation errors have occurred. A 1020 JSON error code may also be returned with details of the specific error. For further details see **Appendix C: JSON Validation Errors**. Proceed to step 3.

- A 422 HTTP response status code indicates first level validation errors. Validate the data attributes included in the exception message and re-submit with valid attributes in a **Update DER Installation** record endpoint. For further details see **Appendix C First Level Validation Errors.** Proceed to step 3.

3. Validate any of the data attributes included in the exception messages and resubmit valid data attributes as per Step 1.

4. Where a 200 HTTP response status code is returned:

- Store the AEMO-provided AC Connection and Device Ids for any newly added DER Equipment or Devices. This information is required to update the DER Register using the **Update DER Installation** API (PUT).

- Review the response to identify any second level validation errors. Validate the data attributes included in any exception messages and re-submit valid data attributes until there are no errors shown in the response. The DER record remains in a **Conditional status** until all errors are resolved. For further details see Appendix C: **Second Level Validation Errors.**

For further information on HTTP response status codes see **HTTP Response Status Codes**.

6 WEM DER NMI and DER Installation APIs

6.1 Authentication

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

- TLS certificates are provided by AEMO and then are self-managed by participants.

- All communications between AEMO's API gateway and participants' gateways use HTTPS. AEMO APIs do not support HTTP.

6.2 Authorisation

WEM DER Installation API requests and WEM DER NMI API requests are authorised with an OAuth token. The token is created using API keys generated in an app. See **Creating an OAuth token**.

When making an API request, include the OAuth token string in a HTTPS Authorization header.

6.3 AEMO API gateway

AEMO's APIs are exchanged through the internet using an API Gateway.

Table 2   AEMO API gateway addresses

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

To access the WEM DER Register APIs, participant's systems need to be authenticated and authorised by AEMO's systems.

6.4   Identifying API calls

To help with support and triaging issues a transaction Id is assigned to every API call to uniquely identify every API request. If there is an issue with a request, the transaction Id provided in the response can be provided to AEMO.

Example: Response with Transaction Id.

```
{
    "transactionId": "44b62acc-069f-44fb-a657-c86e2d4d6c46",
    "data": {}
```

6.5   Request HTTP headers

The following HTTP request headers are required to make a valid API request to AEMO. AEMO's custom header names are preceded with an X.

NOTE: HTTP header parameters are case insensitive.

Table 3   HTTP request header attributes

Parameter	Value(s)	Description
Content-Type	application/json	Content format
Content-Length	A number	Length of the request body in bytes.
Host	Sender host name	Name of the host sending the request
Accept	application/json	Details the expected content type of the response
Content-Encoding	gzip gzip, compress, deflate	(Optional) Specifies any compression applied to the request body. Should be at least one of gzip, compress, deflate. If not provided no compression is assumed.
Accept-Encoding	gzip gzip, compress, deflate	(Optional) Specifies the encoding supported for the response. Should be at least one of gzip, compress, deflate. If not provided no compression is assumed.
X-initiatingParticipantID	EHUB	EHUB has been provided for Western Power to use as their ParticipantId.
X-market	WEM	The market the request is for.
Authorization	Bearer RjzIzEQwf0dezbaAtdiCQWZdANcJ Note: This is an example only.	This is the access token received from the OAuth API.

6.6 HTTP response status codes

AEMO's API Gateway sends an HTTP response status code and message to indicate the success or failure of an API request. A summary of the codes is shown in the following table.

Refer to **WEM DER NMI API** and **WEM DER Installation API** on AEMO's **API Portal** for response examples.

Table 4   HTTP Response status codes

Response	Value	Description
Successful response	200	200 OK The API request was successful.
Successful Created response	201	201 Created The API request was successful and created a new record.
Bad Request	400	400 Bad Request The API request was malformed, check the submitted request parameters or body are valid.
Invalid Credentials	401	401 Unauthorized. Check that the provided credentials are correct and have not expired.
Forbidden	403	403 Forbidden - Insufficient privileges. Check the URL used for the API is correct. This could also occur if the X initiatingParticipant ID and X-Market is incorrect.
Not found	404	404 Resource Not Found - refer to example below. The URL used for the API is incorrect.
Bad HTTP Method	405	405 Method Not Allowed - refer to example below. The HTTP Method (GET, POST, PUT, etc…) is not valid for the API.
Content-Length header required	411	411 Length Required The Content-Length HTTP header was not provided.
Unsupported media type	415	415 Unsupported Media Type The Content-Type header must be application/json
Business validation error	422	422 Unprocessable Entity

Response	Value	Description
		The request was well formed but the submitted content failed business validation rules.
Too Many Requests	429	429 Too Many Requests DER Register calls allow a maximum of 6000 requests per minute. Check that the API calls are not exceeding this limit.
Internal Server Error	500	500 Internal Server Error There was an unexpected error in AEMO's systems while processing this request. Try again, or if this continues then raise a support call to AEMO.
Application Unavailable (down)	503	503 Service Unavailable The API is not currently available. Check if there is a planned or unplanned outage.

6.6.1 Response headers

The following headers are returned in the API response.

Table 5   HTTP response header attributes

Parameter	Value(s)	Description
Content-Type	application/json	Content format.
Content-Length	A number	Length of the request body in bytes.
Content-Encoding	gzip	(Optional) Specifies any compression applied to the request body. Provided when Accept-Encoding is provided in the request.

6.7   API call throttling

The WEM DER Installation API has a rate limit of 6000 requests per minute. When calls exceed the limit, a 429 "Too Many Requests" HTTP response status code is returned.

6.8   WEM DER NMI API

The WEM DER NMI API enables creating, updating, and retrieving details of the NMIs submitted to the DER Register.

Note: Second level validations are not applied to the WEM DER NMI API.

6.8.1   Create NMI record

The endpoint creates a new NMI record.

An NMI record must be created in the DER Register database before any DER installation information is submitted to the DER Register using the **Create DER Installation record** API.

Note: A 1010 error code (NMI does not exist in DER Register database) is returned if this order is not followed.

Table 6   API create NMI details

Method	POST
URL	<API Gateway URL>/wem/v1/der-register/nmi-details
	e.g. For Production this would be:
	https://partner.api.aemo.com.au/wem/v1/der-register/nmi-details

Request payload

A JSON request body is to be submitted with the data fields described in **Appendix A: WEM NMI API Submission Data Fields**.

Example: Create NMI record API request with data for illustrative purposes.

```
{
    "nmi": "8001234567",
    "substation": "Waikiki",
    "postCode": "6171",
    "tni": "WWAI",
    "status": "Active"
}
```

A 201 HTTP status is returned in the response when there's a successful update to the DER Register database.

Example: HTTP Response code description 'Created' with httpStatus 201.

```
httpResponseCodeDescription": [
"Created"],
 "httpStatus": [
201
],

{
    "transactionId": "44b62acc-069f-44fb-a657-c86e2d4d6c46",
    "data": {}
}
```

Validation errors

The request is validated as described in **API validation levels**.

If there are validation errors, a 400 or 422 HTTP status code is returned and details of JSON or first level validation errors.

Example: Create NMI record response with 1020 JSON error codes.

```
{
    "transactionId": "3de65a57-e1d3-4a94-9619-d4aab5424bdb",
    "data": {},
    "errors": [
        {
            "code": 1020,
            "title": "request.body.status",
            "detail": "is not one of enum values:
Active,Extinct",
            "source": null
        },
        {
            "code": 1020,
            "title": "request.body",
            "detail": "requires property \"tni\"",
            "source": null
        }
    ]
}
```

Example: Create DER Installation record API response with first level validation errors codes 1000 and 1010.

```
{
    "transactionId": "b33a779c-f73f-423d-bceb-6fb0576f1e47",
    "errors": [
        {
            "code": "1000",
            "title": "jobNumber",
            "detail": "Job number already in use",
            "source": null
        },
        {
            "code": "1010",
            "title": "nmi",
            "detail": "NMI does not exist in DER Register
database.",
            "source": null
        }
    ]
}
```

6.8.2 Update NMI details

This endpoint updates an existing NMI record for the respective NMI.

Table 7   API update NMI details

Method	PUT
URL	<API Gateway URL>/wem/v1/der-register/nmi-details/<nmi> e.g. For production this would be: **https://partner.api.aemo.com.au/wem/v1/der-register/nmi-details/WAAA0027NG**

Request payload

A JSON request body is submitted with the data fields described in **Appendix A: WEM NMI API submission data fields**.

Example: Update NMI API submission payload format.

```
{
    "nmi": "string",
    "substation": "string",
    "postCode": "string",
    "tni": "string",
    "status": "string"
}
```

Example: Update NMI API submission payload example. Data provided is for illustrated purposes.

```
{
    "nmi": "8001234567",
    "substation": "Waikiki",
    "postCode": "6171",
    "tni": "WWAI",
    "status": "Active"
}
```

Successful response

A 201 HTTP status is returned in the response when there's a successful update to the DER Register database.

Example: HTTP status 201 created response.

```
"httpResponseCodeDescription": [
"Created"],
 "httpStatus": [
201
],
```

Validation error response

The request is validated as described in **Validation Levels**.

If there are validation errors, a HTTP response status code of 400 or 422 is returned in the response. Details of the error code, title which includes the field attribute and detail describing the error message are returned.

Example: 422 HTTP response status code response with a 1010 first level validation error code.

```
  {
    "transactionId": "b33a779c-f73f-423d-bceb-6fb0576f1e47",
    "errors": [
        {
            "code": "1014",
            "title": "postCode",
            "detail": "Invalid postcode: Not located in Western
Australia. postCode must be between 6000 and 6999",
            "source": null
        }
    ]
}
```

6.8.3   **Retrieve NMI details**

This API call is used to return the NMI record details.

Table 8   Retrieve NMI details

Method	GET
URL	{API Gateway URL}/wem/v1/der-register/nmi-details/{nmi} e.g. For production this would be: **https://partner.api.aemo.com.au/wem/v1/derregister/nmidetails/WAAA0027NG**

Successful response

A 200 HTTP response status code is returned in the response the request is successful.

Example: Retrieve NMI details API response format.

```
{
    "transactionId": "<GUID>",
    "data": {
        "nmi": "string",
        "substation": "string",
        "postCode": "string",
        "tni": "string",
        "status": "string",
        "recordCreationDate": "string:date-time",
        "recordUpdateDate": "string:date-time"
    }
}
```

Table 9   Retrieve NMI details response fields

JSON Field	Description
transactionId	Uniquely identifies this API request
nmi	National Metering Identifier
substation	Zone Substation
postcode	Postcode
tni	Transmission Node Identifier
status	NMI Status
recordCreationDate	The date/time that the NMI record was created.
recordUpdateDate	The date/time that the NMI record was last updated.

Example: Retrieve NMI details API example response.

```
{
    "transactionId": "b33a779c-f73f-423d-bceb-
6fb0576f1e47<GUID>",
    "data": {
        "nmi": "8001234567",
        "substation": ""Waikiki",
        "postCode": "6171",
        "tni": "WWAI",
        "status": "Active",
        "recordCreationDate": "string:date-time",
        "recordUpdateDate": "string:date-time"
        "recordCreationDate": "2023-04-21T08:48:15.000+8:00",
        "recordUpdateDate": "2023-04-22T09:50:15.000+8:00"
    }
}
```

Validation error response

JSON schema, first and second level validations do not apply for GET method requests since there is no payload.

A 404 HTTP response status code is returned if the NMI is not found in the DER Register database.

6.9 WEM DER INSTALLATION API

AEMO's WEM DER Installation API enables creating, updating, and retrieving DER installation details in the DER Register database. The API is also used to view and resolve associated exceptions.

6.9.1 Create DER installation record

This endpoint (POST) creates a DER installation record in the DER Register. It is used when a new DER record is to be created, and there is no existing installation record for the respective NMI in the DER Register database.

Note: Where the NMI is already captured as an existing DER installation record in the DER Register database, the **Update DER Installation** (PUT) must be used to make changes to that record.

Table 10   Create DER installation record details

Method	POST
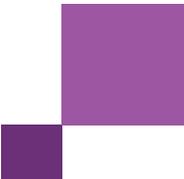
URL	<API Gateway URL>/v2/der-register/installation

Request payload

A JSON request body is submitted with the required information at the installation, AC Connection and DER Device data levels. For help, see **Appendix A: WEM DER Installation API submission data fields**.

Example: The **Create DER Installation record** API submission request is in the following format.

```json
{
    "data":
    {
        "nmi": "string",
        "jobNumber": "string",
        "approvedCapacity": "number",
        "loadCapacity": "number",
        "exportLimitkW": "number",
        "importLimitkW": " number",
        "availablePhasesCount": "number",
        "installedPhasesCount": "number",
        "islandableInstallation": "string",
        "centralProtectionControl": "string",
        "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",
        "otherProtection": "number",
        "installerId": "string",
        "comments": "string",
        "acConnections":
        [
            {
                "nspConnectionId": "string",
                "commissioningDate": "string:date",
                "equipmentType": "string",
                "count": "number",
                "status": "string",
                "equipmentInjectionCapacity": "number",
                "equipmentWithdrawalCapacity": "number",
                "evseOwnershipStatus": "string",
                "authorisedAgent": "string",
                "managementMethod": "string",
                "frequencyRateOfChange": "number",
                "voltageVectorShift": "number",
                "interTripScheme": "string",
                "neutralVoltageDisplacement": "number",
                "details":
                {
                    "serialNumbers": ["string"],
                    "manufacturerName": "string",
                    "modelNumber": "string",
                    "equipmentSeries": "string",
```

                    "equipmentStandard": "string",
                    "regionSetting": "string",
                    "additionalRequirements": "string",
                    "sustainOpOvervoltLimit": "number",
                    "stopAtOverFreq": "number",
                    "stopAtUnderFreq": "number",
                    "dredInverterInteraction": "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":
                [
                    {
                        "nspDeviceId": "string",
                        "type": "string",
                        "comments": "string",
                        "count": "number",
                        "status": "string",
                        "details":
                        {
                            "manufacturerName": "string",
                            "modelNumber": "string",
                            "nominalRatedCapacity": "number",
                            "nominalLoadCapacity": "number",
                            "nominalStorageCapacity": "number"
                        }
                    }
                ]
            }
        ]
    }
```

Example: Create DER Installation record API request payload example. Data provided is for illustrative purposes.

```json
{
  "data": {
        "nmi": "10 digit nmi",
        "jobNumber": "Job Number",
        "approvedCapacity": 0,
        "loadCapacity": 7,
        "exportLimitkW": 0,
        "importLimitkW": 7,
        "availablePhasesCount": 1,
        "installedPhasesCount": 3,
        "islandableInstallation": "No",
        "centralProtectionControl": "No",
        "underFrequencyProtection": null,
        "underFrequencyProtectionDelay": null,
        "overFrequencyProtection": null,
        "overFrequencyProtectionDelay": null,
        "underVoltageProtection": null,
        "underVoltageProtectionDelay": null,
        "overVoltageProtection": null,
        "overVoltageProtectionDelay": null,
        "sustainedOverVoltage": null,
        "sustainedOverVoltageDelay": null,
        "frequencyRateOfChange": null,
        "voltageVectorShift": null,
        "interTripScheme": null,
        "neutralVoltageDisplacement": null,
        "otherProtection": null,
        "installerId": "123456789",
        "comments": "comments",
        "acConnections": [
            {
                "connectionId": null,
                "nspConnectionId": "nspConnectionId",
                "commissioningDate": "2023-10-11",
                "equipmentType": "EVSE no V2G",
                "count": 1,
                "status": "Active",
                "equipmentInjectionCapacity": 0,
                "equipmentWithdrawalCapacity": 7,
                "evseOwnershipStatus": "Private",
                "authorisedAgent": "null",
                "managementMethod": "null",
                "frequencyRateOfChange": null,
                "voltageVectorShift": null,
                "interTripScheme": null,
                "neutralVoltageDisplacement": null,
                "details": {
                    "serialNumbers": [
                        "123456789"
                    ],
                    "manufacturerName": " Manufacturer",
                    "modelNumber": "Model Number",
                    "equipmentSeries": "Equipment Series",
```

```
                          "equipmentStandard": "equipment
standard ",
                          "regionSetting": null,
                          "additionalRequirements": null,
                          "sustainOpOvervoltLimit": null,
                          "stopAtOverFreq": null,
                          "stopAtUnderFreq": null,
                          "dredInverterInteraction": null,
                          "invVoltWattRespMode": null,
                          "invWattRespV1": null,
                          "invWattRespV2": null,
                          "invWattRespV3": null,
                          "invWattRespV4": null,
                          "invWattRespPAtV1": null,
                          "invWattRespPAtV2": null,
                          "invWattRespPAtV3": null,
                          "invWattRespPAtV4": null,
                          "invVoltVarRespMode": null,
                          "invVarRespV1": null,
                          "invVarRespV2": null,
                          "invVarRespV3": null,
                          "invVarRespV4": null,
                          "invVarRespQAtV1": null,
                          "invVarRespQAtV2": null,
                          "invVarRespQAtV3": null,
                          "invVarRespQAtV4": null,
                          "invReactivePowerMode": null,
                          "invFixReactivePower": null,
                          "fixPowerFactorMode": null,
                          "fixPowerFactor": null,
                          "fixPowerFactorQuad": null,
                          "powerRespMode": null,
                          "referencePointP1": null,
                          "referencePointP2": null,
                          "powerFactorAtP1": null,
                          "powerFactorQuadAtP1": null,
                          "powerFactorAtP2": null,
                          "powerFactorQuadAtP2": null,
                          "powerRateLimitMode": null,
                          "powerRampRate": null,
                          "reactivePowerRegulation": null,
                          "voltageSetPoint": null,
                          "voltageSetPointUnit": null,
                          "deadband": null,
                          "droop": null,
                          "baseForDroop": null,
                          "reactivePowerSourceLimit": null,
                          "reactivePowerSinkLimit": null,
                          "reactiveFixPowerFactor": null,
                          "reactiveFixPowerFactorQuad": null,
                          "generatorRampRate": null,
                          "powerRampGradient": null,
                          "frequencySensitiveMode": null,
                          "frequencyDeadband": null,
```

```
                    "frequencyDroop": null
            },
            "devices": [
                {
                    "deviceId": null,
                    "nspDeviceId": "nspDeviceId",
                    "type": "Controlled load",
                    "comments": "Device Comments",
                    "count": 1,
                    "status": "Active",
                    "details": {
                        "manufacturerName":
"Unknown",

                        "modelNumber": "Unknown",
                        "nominalRatedCapacity": 0,
                        "nominalLoadCapacity": 7,
                        "nominalStorageCapacity": 0
                    }
                }
            ]
        }
    ]
  }
}
```

Successful response

A 201 HTTP response status code is returned when a DER Installation record is created in the DER Register database. The response includes the data submitted in the request and the information described in Table 11 below.

```json
{
    "transactionId": "<GUID>",
    {
    "data": {
        "exceptions": [
            {
                "exceptionId"number":,
                "code": "number",
                "title": "string",
                "detail": "string",
                "deviceId: "string",
                "connectionId: "string",
                "recordCreationDate": " string:date-time ",
                "recordUpdateDate": " string:date-time "
            }
        ],
        "nmi": "string",
        "jobNumber": "string",
        "installationStage": "string",
        "recordConfirmedDate": "string:date-time",
        ...
        "acConnections":
        [
            {
                "connectionId": "number",
                "nspConnectionId": "string",
                "installationStage": "string",
                "recordConfirmedDate": "string:date-time",
            ...
                "details":
                {
                ...
                },
                "devices":
                [
                    {
                        "deviceId": "number",
                        "nspDeviceId": "string",
                    "installationStage": "string",
                      "recordConfirmedDate": "string:date-time",

                    ...
                        "details":
                        },
                    "recordCreationDate": "string:date-time",
                    "recordUpdateDate": "string:date-time"
    }
                ],
"recordCreationDate": "string:date-time",
                "recordUpdateDate": "string:date-time"
}
        ],
"recordCreationDate": "string:date-time",
                "recordUpdateDate": "string:date-time"
```

```
        }
}


                        }
                    }
                ]
            }


        ]
    }
}
```

Example: Create DER Installation record API successful response, with a Confirmed installation stage at the installation, AC connection and Device levels. Data provided is for illustrative purposes.

```
    "data": {
        "exceptions": [],
        "nmi": "10 digit nmi",
        "jobNumber": "Job Number",
        "installationStage": "Confirmed",
        "recordConfirmedDate": "2023-09-13T13:52:57.085+08:00",
        "approvedCapacity": 0,
        "loadCapacity": 7,
        "exportLimitkW": 0,
        "importLimitKw": 7,
        "availablePhasesCount": 1,
        "installedPhasesCount": 3,
        "islandableInstallation": "No",
        "centralProtectionControl": "No",
        "installerId": "123456789",
        "comments": "comments",
        "acConnections": [
            {
                "connectionId": 200000006518648,
                "installationStage": "Confirmed",
                "recordConfirmedDate": "2023-09-
13T13:52:57.085+08:00",
                "nspConnectionId": "nspConnectionId",
                "commissioningDate": "2023-10-11",
                "equipmentType": "EVSE no V2G",
                "count": 1,
                "status": "Active",
                "equipmentInjectionCapacity": 0,
                "equipmentWithdrawalCapacity": 7,
                "evseOwnershipStatus": "Private",
                "authorisedAgent": "null",
                "managementMethod": "null",
                "details": {
                    "serialNumbers": [
                        "123456789"
                    ],
                    "manufacturerName": "Manufacturer",
                    "modelNumber": "Model Number",
                    "equipmentSeries": "Equipment Series",
                    "equipmentStandard": "equipment standard"
                },
                "devices": [
                    {
                        "deviceId": 200000006583997,
                        "installationStage": "Confirmed",
                        "recordConfirmedDate": "2023-09-
12T08:39:53.496+08:00",
                        "nspDeviceId": "nspDeviceId",
                        "type": "Controlled load",
                        "comments": "Device Comments",
                        "count": 1,
                        "status": "Active",
                        "details": {
                            "manufacturerName": "Unknown",
```

```
                        "modelNumber": "Unknown",
                        "nominalRatedCapacity": 0,
                        "nominalLoadCapacity": 7,
                        "nominalStorageCapacity": 0
                    },
                    "recordCreationDate": "2023-09-
13T13:52:57.085+08:00",
                    "recordUpdateDate": "2023-09-
13T13:52:57.085+08:00"
                }
            ],
            "recordCreationDate": "2023-09-
13T13:52:57.085+08:00",
            "recordUpdateDate": "2023-09-
13T13:52:57.085+08:00"
        }
    ],
    "recordCreationDate": "2023-09-13T13:52:57.085+08:00",
    "recordUpdateDate": "2023-09-13T13:52:57.085+08:00"
    }
}
```

Table 11   AEMO generated fields in DER Installation response payloads

JSON Field	Description
Installation	
transactionId	Unique ID for the API request
installationStage	Indicates the installation stage. One of: - Confirmed – Passed second level validations - Conditional - . second level validation errors exist
recordCreationDate	The date/time in AWST that the NMI level details were first created, e.g."2021-04-20T10:50:03.000+8:00"
recordUpdateDate	The date/time in AWST that the NMI level details were last updated, e.g."2023-04-21T08:48:15.000+8:00"
AC Connections	
connectionId	The AEMO generated unique Connection Id, this must be provided in the **Update DER Installation** API request to be able to update the record.
installationStage	Indicates the installation stage. One of: - Confirmed – Passed second level validations - Conditional - . second level validation errors exist
recordConfirmedDate	The date/time when the Connection record was Confirmed. This will be null if the record is not Confirmed.
recordCreationDate	The date/time when the Connection record was created.
recordUpdateDate	The date/time when the Connection record was last updated.
Devices	
deviceId	The AEMO generated unique Device Id, this must be provided in the **Update DER Installation** API request to be able to update the record.
installationStage	Indicates the installation stage One of: Confirmed or Conditional.

JSON Field	Description
	This indicates if the Device record is Conditional (i.e. second level validation errors exist) or Confirmed (i.e. no second level Validation errors exist).
recordConfirmedDate	The date/time that the Device record was confirmed. This will be null if the record is not confirmed.
recordCreationDate	The date/time when the Device record was created.
recordUpdateDate	The date/time when the Device record was last updated.
Exceptions (where applicable)	
exceptionId	The AEMO generated unique Exception Id generated upon submission that fails validation.
code	The code used to indicate the type of exception
title	The name of the affected field/attribute
detail	The description of the exception
deviceId	The Device Id that the exception is related to.
connectionId	The Connection Id that the exception is related to.

Validation error response

The request is validated as described in **Validation Levels**.

If there are any validation errors an HTTP response status code of 400 or 422 is returned with details of the error code, title which includes the affected field attribute and detail which describes the exception message.

Example: A Create DER API response which has returned three separate first level validation error codes 1010, 1000 and 1111.

```
  {
    "errors": [
        {
            "code": "1010",
            "title": "nmi",
            "detail": "NMI does not exist in DER Register
database.",
            "source": null
        },
        {
            "code": "1000",
            "title": "jobNumber",
            "detail": "Job number already in use.",
            "source": null
        },
        {
            "code": "1111",
            "title": "installation.acConnections.count",
            "detail": "Invalid submission Number of Devices and
AC connections must match.",
            "source": null
        }
    ],
    "transactionId": "2058efdb-ec8b-4dcb-a521-1cf264d2708f"
}
```

6.9.2   Update DER installation record

This endpoint updates an existing DER Installation record for the respective NMI. It is used to:

- Update information previously submitted at the Installation, AC connection and Device level.

- Add new AC connections and/or Devices to an existing DER installation record.

Table 12   Update Installation record details

Method	PUT
URL	<API Gateway URL>/v2/der-register/installation

Request payload

A JSON request body must be submitted with the data fields described in **Appendix A: WEM DER Installation API submission data fields**.

When updating an existing Connection or Device, the payload is the same as a **Create DER Installation record** request, but you must also provide the "connectionId" and "deviceId".

When adding new AC connections and/or Devices to an existing DER installation record, do not provide the connectionId and the deviceId for the new connection and device to be updated.

Example: Update DER Installation API submission example payload

```
{
    "data":
    {
        "nmi": "string",
      ...
        "acConnections":
        [
            {
              "connectionId": "number",
                "nspConnectionId": "string",
            ...
                "details":
                {
                ...
                },
                "devices":
                [
                    {
                        "deviceId": "number",
                        "nspDeviceId": "string",
                    ...
                        "details":
                        {
                        ...
                        }
                    }
                ]
            }
        ]
    }
}
```

Example: Update DER Installation API submission to update an existing DER record (connectionid and deviceId provided). Data provided is for illustrative purposes.

```
"data": {
    "nmi": "10 digit nmi",
    "jobNumber": "Job Number",
    "approvedCapacity": 5,
    "loadCapacity": 0,
    "exportLimitkW": 5,
    "importLimitkW": 0,
    "availablePhasesCount": 1,
    "installedPhasesCount": 1,
    "islandableInstallation": "No",
    "centralProtectionControl": "No",
    "underFrequencyProtection": null,
    "underFrequencyProtectionDelay": null,
    "overFrequencyProtection": null,
    "overFrequencyProtectionDelay": null,
    "underVoltageProtection": null,
    "underVoltageProtectionDelay": null,
    "overVoltageProtection": null,
    "overVoltageProtectionDelay": null,
    "sustainedOverVoltage": null,
    "sustainedOverVoltageDelay": null,
    "frequencyRateOfChange": null,
    "voltageVectorShift": null,
    "interTripScheme": null,
    "neutralVoltageDisplacement": null,
    "otherProtection": null,
    "installerId": "123456789",
    "comments": "Scenario Example1",
    "acConnections": [
        {
            "connectionId": 200000006518641,
            "nspConnectionId": "nspConnectionId ",
            "commissioningDate": "2023-10-11",
            "equipmentType": "Solar PV Inverter",
            "count": 1,
            "status": "Active",
            "equipmentInjectionCapacity": 5,
            "equipmentWithdrawalCapacity": 0,
            "evseOwnershipStatus": null,
            "authorisedAgent": "agent name",
            "managementMethod": "OEM API",
            "frequencyRateOfChange": null,
            "voltageVectorShift": null,
            "interTripScheme": null,
            "neutralVoltageDisplacement": null,
            "details": {
                "serialNumbers": [
                    "123456789"
                ],
                "manufacturerName": "Manufacturer",
                "modelNumber": "Model Number",
                "equipmentSeries": "Equipment Series",
```

```json
        "equipmentStandard":
"AS/NZS.4777.2:2020",

        "regionSetting": "B",
        "additionalRequirements": "None",
        "sustainOpOvervoltLimit": null,
        "stopAtOverFreq": null,
        "stopAtUnderFreq": null,
        "dredInverterInteraction": null,
        "invVoltWattRespMode": null,
        "invWattRespV1": null,
        "invWattRespV2": null,
        "invWattRespV3": null,
        "invWattRespV4": null,
        "invWattRespPAtV1": null,
        "invWattRespPAtV2": null,
        "invWattRespPAtV3": null,
        "invWattRespPAtV4": null,
        "invVoltVarRespMode": null,
        "invVarRespV1": null,
        "invVarRespV2": null,
        "invVarRespV3": null,
        "invVarRespV4": null,
        "invVarRespQAtV1": null,
        "invVarRespQAtV2": null,
        "invVarRespQAtV3": null,
        "invVarRespQAtV4": null,
        "invReactivePowerMode": null,
        "invFixReactivePower": null,
        "fixPowerFactorMode": null,
        "fixPowerFactor": null,
        "fixPowerFactorQuad": null,
        "powerRespMode": null,
        "referencePointP1": null,
        "referencePointP2": null,
        "powerFactorAtP1": null,
        "powerFactorQuadAtP1": null,
        "powerFactorAtP2": null,
        "powerFactorQuadAtP2": null,
        "powerRateLimitMode": null,
        "powerRampRate": null,
        "reactivePowerRegulation": null,
        "voltageSetPoint": null,
        "voltageSetPointUnit": null,
        "deadband": null,
        "droop": null,
        "baseForDroop": null,
        "reactivePowerSourceLimit": null,
        "reactivePowerSinkLimit": null,
        "reactiveFixPowerFactor": null,
        "reactiveFixPowerFactorQuad": null,
        "generatorRampRate": null,
        "powerRampGradient": null,
        "frequencySensitiveMode": null,
        "frequencyDeadband": null,
```

```
                        "frequencyDroop": null
                },
                "devices": [
                        {
                                "deviceId": 200000006583989,
                                "nspDeviceId": "nspDeviceId",
                                "type": "Solar PV",
                                "comments": "Device Comments",
                                "count": 20,
                                "status": "Active",
                                "details": {
                                        "manufacturerName": "
Manufacturer Name",
                                        "modelNumber": "Model
Number",
                                        "nominalRatedCapacity": 0.3,
                                        "nominalLoadCapacity": 0,
                                        "nominalStorageCapacity": 0
                                }
                        }
                ]
        }
}
```

Successful response

A 200 HTTP response status code is returned when the update to the DER Register database is successful.

Example: Update DER Installation successful response to update an existing DER record which has returned installation stages 'Confirmed'.

```
{
    "data": {
        "exceptions": [],
        "nmi": "10 digit nmi",
        "jobNumber": "Job Number",
        "installationStage": "Confirmed",
        "recordConfirmedDate": "2023-09-13T13:35:00.955+08:00",
        "approvedCapacity": 5,
        "loadCapacity": 0,
        "exportLimitkW": 5,
        "importLimitKw": 0,
        "availablePhasesCount": 1,
        "installedPhasesCount": 1,
        "islandableInstallation": "No",
        "centralProtectionControl": "No",
        "installerId": "123456789",
        "comments": "comments",
        "acConnections": [
            {
                "connectionId": 200000006518641,
                "installationStage": "Confirmed",
                "recordConfirmedDate": "2023-09-
13T13:35:00.955+08:00",
                "nspConnectionId": "nspConnectionId",
                "commissioningDate": "2023-10-11",
                "equipmentType": "Solar PV Inverter",
                "count": 1,
                "status": "Active",
                "equipmentInjectionCapacity": 5,
                "equipmentWithdrawalCapacity": 0,
                "authorisedAgent": "agent",
                "managementMethod": "OEM API",
                "details": {
                    "serialNumbers": [
                        "123456789"
                    ],
                    "manufacturerName": "Manufacturer",
                    "modelNumber": "Model Number",
                    "equipmentSeries": "Equipment Series",
                    "equipmentStandard": "AS/NZS.4777.2:2020",
                    "regionSetting": "B",
                    "additionalRequirements": "None"
                },
                "devices": [
                    {
                        "deviceId": 200000006583989,
                        "installationStage": "Confirmed",
                        "recordConfirmedDate": "2023-09-
12T08:39:53.496+08:00",
                        "nspDeviceId": "nspDeviceId",
                        "type": "Solar PV",
                        "comments": "Device Comments",
                        "count": 20,
                        "status": "Active",
```

```
                                "details": {
                                    "manufacturerName": "Manufacturer
name",
                                    "modelNumber": "Model Number",
                                    "nominalRatedCapacity": 0.3,
                                    "nominalLoadCapacity": 0,
                                    "nominalStorageCapacity": 0
                                },
                                "recordCreationDate": "2023-09-
13T13:35:00.955+08:00",
                                "recordUpdateDate": "2023-09-
13T13:35:00.955+08:00"
                            }
                        ],
                        "recordCreationDate": "2023-09-
13T13:35:00.955+08:00",
                        "recordUpdateDate": "2023-09-
13T13:35:00.955+08:00"
                    }
                ],
                "recordCreationDate": "2023-09-13T13:35:00.955+08:00",
                "recordUpdateDate": "2023-09-13T13:35:00.955+08:00"
            }
```

Validation error response

The request is validated as described in **API validation levels**.

If there are validation errors, a 400 or 422 HTTP response status code is returned in the header along with details of the error code. It also includes the affected field attribute and detail.

Example: Update DER Installation submission response to update an existing DER record which has returned two first level validation 1020 and 1111 errors**.**

```
{
    "errors": [
        {
            "code": "1020",
            "title": "installation.acConnections.statusCode",
            "detail": "Must be one of: Active, Decommissioned",
            "source": null
        },
        {
            "code": "1111,
            "title": "installation.acConnections.count",
            "detail": "Invalid submission Number of Devices and
AC Connections must match.",
            "source": null
        }
    ],
    "transactionId": "b9658c05-aa33-404f-ab16-135562457277"
}
```

6.9.3 Retrieve DER installation record

Retrieves the current (latest) version of a DER installation (for a single NMI) record for the specified NMI. The returned data includes the latest installation, AC Connections and Devices information where a record has been created in the DER Register database.

Only fields with a value stored in the DER Register are returned in the response. If a field value was not previously provided in a **Create DER Installation record** or **Update DER Installation** record request, it is not returned. This can occur if it's not required, or the field was provided with a NULL value.

Table 13   Details to retrieve the latest DER record

Method	GET
URL	<API Gateway URL>/v2/der-register/installation/<nmi>

Successful response

A 200 HTTP response status code is returned for a successful request.

The JSON response is in the following format below. The data values returned are dependent on the latest version of data stored in the DER Register database.

```json
{
    "data": {
        "exceptions": [
            {
                "exceptionId"number":,
                "code": "number",
                "title": "string",
                "detail": "string",
                "deviceId: "string",
                "connectionId: "string",
                "recordCreationDate": "string:date-time ",
                "recordUpdateDate": "string:date-time "
            }
        ],
        "nmi": "string",
        "jobNumber": "string",
        "installationStage": "string",
        "recordConfirmedDate": "string:date-time",
        "approvedCapacity": "number",
        "loadCapacity": "number",
        "exportLimitkW": "number",
        "importLimitkW": " number",
        "availablePhasesCount": "number",
        "installedPhasesCount": "number",
        "islandableInstallation": "string",
        "centralProtectionControl": "string",
        "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",
        "otherProtection": "number",
        "installerId": "string",
        "comments": "string",
        "acConnections":
        [
            {
                "connectionId": "number",
                "nspConnectionId": "string",
                "commissioningDate": "string:date",
                "installationStage": "string",
                "recordUpdateDate": "string:date-time"
                "equipmentType": "string",
                "count": "number",
                "status": "string",
```

```
            "equipmentInjectionCapacity": "number",
            "equipmentWithdrawalCapacity": "number",
            "evseOwnershipStatus": "string",
            "authorisedAgent": "string",
            "managementMethod": "string",
            "frequencyRateOfChange": "number",
            "voltageVectorShift": "number",
            "interTripScheme": "string",
            "neutralVoltageDisplacement": "number",
            "details":
            {
                "serialNumbers": ["string"],
                "manufacturerName": "string",
                "modelNumber": "string",
                "equipmentSeries": "string",
                "equipmentStandard": "string",
                "regionSetting": "string",
                "additionalRequirements": "string",
                "sustainOpOvervoltLimit": "number",
                "stopAtOverFreq": "number",
                "stopAtUnderFreq": "number",
                "dredInverterInteraction": "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",
```

```json
                "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",
                    "installationStage": "string",
                    "recordConfirmedDate": "string:date-time",
string:date-time                    "type": "string",
                    "comments": "string",
                    "count": "number",
                    "status": "string",
                    "details":
                    {
                        "manufacturerName": "string",
                        "modelNumber": "string",
                        "nominalRatedCapacity": "number",
                        "nominalLoadCapacity": "number",
                        "nominalStorageCapacity": "number"
},
                    "recordCreationDate": "string:date-time
",
                    "recordUpdateDate": "string:date-time "
                }
            ],
            "recordCreationDate": "string:date-time ",
            "recordUpdateDate": "string:date-time "
        }
    ],
    "recordCreationDate": "string:date-time ",
    "recordUpdateDate": "string:date-time "
```

Error response

JSON schema and first and second level validations do not apply since there is no payload for GET requests.

If the NMI cannot be found in the DER Register database, a 1013 NMI cannot be found in DER Register Database error is returned, For further information on HTTP response status codes, see **HTTP Response Status Codes**.

6.9.4   Retrieve DER installation history

This endpoint retrieves the current (latest) and all historical versions of a DER installation for an NMI in the DER Register database.

Returned records includes a recordStartDate and recordEndDate indicating the record history. The records are not returned in a hierarchical structure. Instead, the version history is returned for the elements: installation, acConnection, acConnectionDetails, device for the respective NMI.

Only fields with a value stored in the DER Register are returned in the response. If a field value was not previously provided in a **Create DER Installation record** or **Update DER Installation** record request, it is not returned. This can occur if it's not required or the field was provided with a NULL value.

Table 14   Retrieve DER Installation history details

Method	GET
URL	<API Gateway URL>/v2/der-register/installation/<nmi>/history

Successful response

A 200 HTTP response status code is returned for a successful request.

Example: Retrieve DER Installation history details response returns JSON in the following format.

```json
{
    "data":
    {
      "installations":[
        {
          "nmi": "string",
          "jobNumber": "string",
          "recordCreationDate": "string:date-time",
          "recordUpdateDate": "string:date-time",
          "recordStartDate": "string:date-time",
          "recordEndDate": "string:date-time",
          ...
        }
      ],
      "acConnections": [
      {
          "connectionId": "number",
          "recordCreationDate": "string:date-time",
             "recordUpdateDate": "string:date-time",
         "recordStartDate": "string:date-time",
         "recordEndDate": "string:date-time",
         ...
      }
      ],
       "acConnectionDetails": [
        {
          "connectionId": "number",
        "recordCreationDate": "string:date-time",
             "recordUpdateDate": "string:date-time",
        "recordStartDate": "string:date-time",
        "recordEndDate": "string:date-time",
        ...
      }
      ],
      "devices": [
        {
          "connectionId": "number",
          "deviceId": "number",
        "recordCreationDate": "string:date-time",
             "recordUpdateDate": "string:date-time",
        "recordStartDate": "string:date-time",
        "recordEndDate": "string:date-time",
        ...
        }
      ]
    }
}
```

Example: Retrieve DER Installation history request response with current and historical details. Data provided is for illustrative purposes.

```
{
    "data": {
        "installations": [
            {
                "nmi": "10 digit nmi ",
                "installationStage": "Confirmed",
                "recordConfirmedDate": "2023-09-
18T14:32:07.887+08:00",
                "lnsp_id": "lnsp id",
                "jobNumber": "Job Number",
                "installer_id": "123456789",
                "approvedCapacity": 5.000,
                "loadCapacity": 0.000,
                "exportLimitkW": 5.000,
                "importLimitKw": 0.000,
                "availablePhasesCount": 1,
                "installedPhasesCount": 1,
                "islandableInstallation": "No",
                "comments": "comments",
                "centralProtectionControl": "No",
                "recordCreationDate": "2023-09-
18T14:32:07.887+08:00",
                "recordUpdateDate": "2023-09-
18T14:32:07.887+08:00",
                "recordStartDate": "2023-09-
18T14:32:07.887+08:00",
                "recordEndDate": "9999-12-
30T22:00:00.000+08:00"
            }
        ],
        "acConnections": [
            {
                "connectionId": 200000006518712,
                "nspConnectionId": "nspConnectionId",
                "installationStage": "Confirmed",
                "recordConfirmedDate": "2023-09-
18T14:32:07.887+08:00",
                "commissioningDate": "2023-10-11",
                "authorisedAgent": "agent name",
                "managementMethod": "OEM API",
                "equipmentType": "Solar PV Inverter",
                "count": 1,
                "equipmentInjectionCapacity": 5.000,
                "equipmentWithdrawalCapacity": 0.000,
                "status": "Active",
                "recordCreationDate": "2023-09-
18T14:32:07.887+08:00",
                "recordUpdateDate": "2023-09-
18T14:32:07.887+08:00",
                "recordStartDate": "2023-09-
18T14:32:07.887+08:00",
                "recordEndDate": "9999-12-
30T22:00:00.000+08:00"
            }
```

```
            ],
            "acConnectionDetails": [
                {
                    "connectionId": 200000006518712,
                    "regionSetting": "B",
                    "serialNumbers": "123456789",
                    "manufacturerName": "Manufacturer",
                    "modelNumber": "Model Number",
                    "equipmentSeries": "Equipment Series",
                    "equipmentStandard": "AS/NZS.4777.2:2020",
                    "additionalRequirements": "None",
                    "recordCreationDate": "2023-09-
18T14:32:07.887+08:00",
                    "recordUpdateDate": "2023-09-
18T14:32:07.887+08:00",
                    "recordStartDate": "2023-09-
18T14:32:07.887+08:00",
                    "recordEndDate": "9999-12-
30T22:00:00.000+08:00"
                }
            ],
            "devices": [
                {
                    "deviceId": 200000006584062,
                    "connectionId": 200000006518712,
                    "nmi": "8020999042",
                    "nspDeviceId": "nspDeviceId",
                    "type": "Solar PV",
                    "count": 20,
                    "installationStage": "Confirmed",
                    "recordConfirmedDate": "2023-09-
12T08:40:23.320+08:00",
                    "status": "Active",
                    "comments": "Device Comment",
                    "manufacturerName": "Manufacturer Name",
                    "modelNumber": "Model Number",
                    "nominalRatedCapacity": 0.300,
                    "nominalLoadCapacity": 0.000,
                    "nominalStorageCapacity": 0.000,
                    "recordCreationDate": "2023-09-
18T14:32:07.887+08:00",
                    "recordUpdateDate": "2023-09-
18T14:32:07.887+08:00",
                    "recordStartDate": "2023-09-
18T14:32:07.887+08:00",
                    "recordEndDate": "9999-12-
30T22:00:00.000+08:00"
                }
            ]
        }
}
```

Error response

JSON schema and first and second level validations do not apply since there is no payload for GET requests.

If the NMI cannot be found in the DER Register database an exception is returned, 1013 "NMI cannot be found in DER Register Database".

6.9.5   Retrieve DER installation records by parameter

This endpoint retrieves the current versions of one or more DER records (for a single NMI or a list of NMIs) by the specified query parameter.

Only fields with a value stored in the DER Register are returned in the response. If a field value was not previously provided in a **Create DER Installation record** or **Update DER Installation** record request, it is not returned. This can occur if it's not required, or the field was provided with a NULL value.

Table 15   Retrieve DER records details

Method	GET
URL	<API Gateway URL>/v2/der-register/installation?<query parameters>

Query Parameters

At least one query parameter must be provided to avoid returning an error code 1000.

Parameter	Description
nmi	Comma separated list of NMIs. Returns records for the specified NMIs.
installationStage	One of "Confirmed" or "Conditional". Returns records where the DER Record is: - Confirmed – both the AC Connections and Devices are 'Confirmed'. - Conditional – at least one AC Connection or Device is 'Conditional'
equipmentType	One of: - Inverter - Other - Battery Storage Inverter - Controllable Load - Hybrid Inverter - EVSE V2G - EVSE no V2G - Rotating Machine - Solar PV Inverter Returns records for the specified equipmentType. **Note**: The equipmentType is case sensitive and enumerated and is required to be provided as exactly as outlined above and returns an

Parameter	Description
	error if this is not met: Error code 1020 'Must be one of: Inverter, Other, Battery Storage Inverter, Controllable Load, Hybrid Inverter, EVSE V2G, EVSE no V2G, Rotating Machine, Solar PV Inverter.' For example, 'Unknown_equipment' is not an accepted Equipment Type.
deviceType	One of: - Solar PV - Storage - Controlled load - Co Tri-generation - Fossil - Liquid fuel - Other - Hydro - Wind - Waste to energy - Unknown_Device Returns records for the specified deviceType. **Note**: The deviceType is case sensitive and enumerated requiring the Device Type to be provided as exactly as outlined above and returns an error if this is not met: Error code 1020: 'Must be one of: Solar PV, Storage, Controlled load, Co Tri generation, Fossil, Liquid fuel, Other, Hydro, Wind, Waste to energy, Unknown_Device.'
fromCommissioningDate	A date in the format: yyyy-mm-dd Returns records where the CommissioningDate is greater than or equal to this value. **Note:** date must be in format yyyy-mm-dd or an error may be returned, error code 1020, 'fromCommissioningDate Must be a valid date with the format yyyy-mm-dd.'
toCommissioningDate	A date in the format: yyyy-mm-dd. Returns records where the CommissioningDate is less than or equal to this value. **Note:** date must be in format yyyy-mm-dd or an error may be returned: Error code 1020, 'fromCommissioningDate Must be a valid date with the format yyyy-mm-dd.'
page	A number between 1 and the total number of available pages. Determines which page of records to return. **Note:** If a page number is not provided it is defaulted to 1. A maximum value of 100 pages can be submitted.
pageSize	One of: 25, 50 or 100 Determines how many records are returned in the response. **Note:** If a page number is not provided it is defaulted to 50. An error code 1020 titled ' Must be one of: 25,50 or 100 will be returned where a pagesize provided is not recognised.

Successful response

A 200 HTTP response status code is returned for a successful request.

Example: Retrieve DER Installation records request by parameter returns in the response an array of DER records in the following format.

```
{
    "data":
    {
      "derRecords":[
        {
          "nmi": "string",
          "jobNumber": "string",
          "recordCreationDate": "string:date-time",
          "recordUpdateDate": "string:date-time"
          "approvedCapacity": "number",
          "loadCapacity": "number",
          ...
        ]
      }
    "meta": {
        "totalRecords": 422,
        "totalPages": 17
    }
}
```

Example: Retrieve DER Installation records response to a Retrieve DER Installation by parameter request using the NMI parameter with three different NMI's (NMI examples A, B, C). The current version of the data stored in the DER Register database is returned for the three NMI's.

```json
    "data": {
        "derRecords": [
            {
                "nmi": "nmi example A",
                "jobNumber": "job number",
                "installationStage": "Confirmed",
                "approvedCapacity": 29.900,
                "availablePhasesCount": 1,
                "installedPhasesCount": 1,
                "islandableInstallation": "No",
                "centralProtectionControl": "No",
                "installerId": "installer id",
                "comments": "comments",
                "acConnections": [
                    {
                        "connectionId": 200000005478376,
                        "installationStage": "Confirmed",
                        "recordConfirmedDate": "2021-02-
26T07:26:32.803+08:00",
                        "nspConnectionId": "1048631",
                        "commissioningDate": "2021-01-19",
                        "equipmentType": "Inverter",
                        "count": 1,
                        "status": "Active",
                        "equipmentInjectionCapacity": 0.000,
                        "details": {},
                        "devices": [
                            {
                                "deviceId": 200000005507253,
                                "installationStage":
"Confirmed",
                                "recordConfirmedDate": "2021-
02-26T07:26:32.803+08:00",
                                "nspDeviceId": "10606389",
                                "type": "Solar PV",
                                "count": 1,
                                "status": "Active",
                                "details": {
                                    "nominalRatedCapacity":
39.960,
                                    "nominalStorageCapacity":
0.000
                                },
                                "recordCreationDate": "2021-02-
26T07:26:32.803+08:00",
                                "recordUpdateDate": "2021-02-
26T07:26:32.803+08:00"
                            }
                        ],
                        "recordCreationDate": "2021-02-
26T07:26:32.803+08:00",
                        "recordUpdateDate": "2021-02-
26T07:26:32.803+08:00"
                    }
```

```
                ],
                "recordCreationDate": "2021-02-
26T07:26:32.803+08:00",
                "recordUpdateDate": "2021-02-
26T07:26:32.803+08:00"
            },
            {
                nmi": "nmi example B,
                "jobNumber": "job number",
                "installationStage": "Conditional",
                "approvedCapacity": 3000.000,
                "loadCapacity": 5000.000,
                "exportLimitkW": 2900.000,
                "importLimitKw": 3000.000,
                "availablePhasesCount": 1,
                "installedPhasesCount": 1,
                "islandableInstallation": "Yes",
                "centralProtectionControl": "No",
                "acConnections": [
                    {
                        "connectionId": 200000005151815,
                        "installationStage": "Conditional",
                        "commissioningDate": "2023-10-11",
                        "equipmentType": "Hybrid Inverter",
                        "count": 1,
                        "status": "Active",
                        "details": {},
                        "devices": [
                            {
                                "deviceId": 200000005179289,
                                "installationStage":
"Conditional",
                                "nspDeviceId": "4569999",
                                "type": "Storage",
                                "count": 1,
                                "status": "Active",
                                "details": {},
                                "recordCreationDate": "2023-08-
28T16:47:42.553+08:00",
                                "recordUpdateDate": "2023-08-
28T16:47:42.553+08:00"
                            }
                        ],
                        "recordCreationDate": "2023-08-
28T19:18:14.660+08:00",
                        "recordUpdateDate": "2023-08-
28T19:18:14.660+08:00"
                    }
                ],
                "recordCreationDate": "2023-08-
28T16:47:42.553+08:00",
                "recordUpdateDate": "2023-08-
28T16:47:42.553+08:00"
            },
```

```json
            {
                "nmi": "nmi example C",
                "jobNumber": "job number",
                "installationStage": "Conditional",
                "approvedCapacity": 3000.000,
                "loadCapacity": 5000.000,
                "exportLimitkW": 2900.000,
                "importLimitKw": 3000.000,
                "availablePhasesCount": 1,
                "installedPhasesCount": 1,
                "islandableInstallation": "Yes",
                "centralProtectionControl": "No",
                "acConnections": [
                    {
                        "connectionId": 200000005151854,
                        "installationStage": "Conditional",
                        "commissioningDate": "2023-10-11",
                        "equipmentType": "EVSE V2G",
                        "count": 1,
                        "status": "Active",
                        "details": {},
                        "devices": [
                            {
                                "deviceId": 200000005179330,
                                "installationStage":
"Conditional",
                                "type": "Storage",
                                "count": 1,
                                "status": "Active",
                                "details": {},
                                "recordCreationDate": "2023-08-
28T16:53:04.403+08:00",
                                "recordUpdateDate": "2023-08-
28T16:53:04.403+08:00"
                            }
                        ],
                        "recordCreationDate": "2023-08-
28T16:53:04.403+08:00",
                        "recordUpdateDate": "2023-08-
28T16:53:04.403+08:00"
                    }
                ],
                "recordCreationDate": "2023-08-
28T16:53:04.403+08:00",
                "recordUpdateDate": "2023-08-
28T16:53:04.403+08:00"
            },
          "meta": {
        "totalRecords": 3,
        "totalPages": 1     }}
```
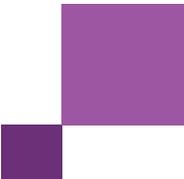
Error response

JSON schema and first and second level validations do not apply since there is no payload for GET requests.

If the NMI cannot be found in the DER Register database, an error is returned: "1013 – NMI cannot be found in DER Register Database".

Appendix A. API Parameter Details

This appendix outlines the DER Generation Information to be submitted electronically to AEMO via AEMO's Application Programming Interface (API) in accordance with the WEM Procedure Distributed Energy Resource (DER) Register Information (Paragraph 4 and Appendix A) and this Technical Specification.

WEM NMI API submission data fields

Table 16 is to be read in conjunction with Appendix A DER Register Data Model of the Procedure: Distributed Energy Resource (DER) Register Information. The table contains additional technical information, including the API field name, permitted values and ranges to be provided and details of the error codes to be resolved. All data fields must be provided when using the **Create NMI record** API and the **Update NMI details** API.

The table provides API details applicable to the API NMI submission payloads (POST and PUT API call methods) when:

- Creating a new NMI record (**Create NMI record** - POST API call method).

- Submitting updated DER Generation information if the information is not submitted, incomplete, inaccurate (**Update NMI details** - PUT API call method).

- Resolving associated validation error responses and error codes returned in the API response. For further descriptions of the error codes, see Appendix C: Validation Errors.

Table 16   WEM NMI API submission data fields

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes	First Level Validation Error Codes
NMI	nmi	Alpha-numeric - string(10)	All – Mandatory Field	8001000000 to 8020999999 or WAAA000000 to	The National Metering Identifier allocated by the Network Operator for each Connection Point where the	1020 – Does not meet maximum length of 10. 1020 – Does not meet minimum length of 10.	1010 – Invalid submission: Value must be between 8001000000 to 8020999999 or WAAA000000 to

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes	First Level Validation Error Codes
				WAAAZZZZZZ excluding WAAAW.	DER installation has been installed.	1020 – requires property "nmi" (i.e. field name is not provided in the API). 1020 – request.body 'nmi' is not of a type(s) string (i.e. null value has been provided).	WAAAZZZZZZ excluding WAAAW. 1020 – Invalid submission: Mismatch between path parameter NMI and request payload NMI. 1020 - requires property "nmi" (i.e. field is provided as spaces within the length of 10). 1020 - Invalid submission: NMI already exists. (i.e. creating a nmi which already exists).
NMI TNI	tni	Alpha-numeric - string(4)	All - Mandatory Field	To align with the code allocated by the Network Operator.	The code identifying the Transmission Node Identifier.	1020 – Does not meet maximum length of 4. 1020 – Does not meet minimum length of 4. 1020 - requires property "tni" (i.e. field name is not provided in the API). 1020 – request.body 'tni' is not of a type(s) string (i.e. null value has been provided).	1020 – tni contains control characters.(i.e. contains ([\r\n\"\t\f\]+)');)) 1020 - requires property "tni" (i.e. field is provided as spaces within the length of 4).
NMI Status	status	Text – string(7)	All - Mandatory Field	Active, Extinct	• Active: Applies when an NMI is energised. • Extinct: Applies when the Connection Point has been permanently removed. To maintain data integrity, where an NMI becomes extinct, the Network Operator must submit a	1020 – Must be one of: Active, Extinct. 1020 – requires property "status" (i.e. field name is not provided in the API). 1020 – request.body 'status' is not one of enum values: Active, Extinct (i.e. null value has been provided).	1020 - requires property "status" (i.e. field is provided as spaces within the length of 4).

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes	First Level Validation Error Codes
					change to change the NMI Status to extinct. **Note -** When submitting a change to update an NMI status to Extinct all associated DER Equipment and DER Device Status' must also be in a Decommissioned status (prior to or with that update).		
NMI Zone Substation	substation	Alpha-numeric - string(40)	All - Mandatory Field	To align with the name ID allocated by the Network Operator.	The name ID of the Zone Substation to which the NMI is connected. **Note –** Descriptions that do not identify the Zone Substation should not be used.	1020 – Does not meet maximum length of 40. 1020 – Does not meet minimum length of 1. (i.e. no value is provided). 1020 – requires property "substation" (i.e. field name is not provided in the API). 1020 – request.body 'substation' is not of a type(s) string (i.e. null value has been provided).	1020 – substation contains control characters (i.e. contains ([\r\n\"\t\f\]+)');)). 1020 - requires property "substation" (i.e. field is provided as spaces within the length of 40).
NMI Postcode	postCode	Alpha-numeric - string(4)	All - Mandatory Field	6000 to 6999	The postcode where the NMI is installed.	1020 – Does not meet maximum length of 4. 1020 – Does not meet minimum length of 4. 1020 – requires property '"postCode" (i.e. field name is not provided in the API).). 1020 – request.body 'postcode' is not of a type(s) string (i.e. null	1014 - Invalid postcode: Not located in Western Australia. (i.e. Postcode must be between 6000 and 6999). 1020 - requires property "postCode" (i.e. field is provided as spaces within the length of 4).

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes	First Level Validation Error Codes
						value has been provided).	

WEM DER Installation API submission data fields

Table 17 is to be read in conjunction with Appendix A 'DER Register Data Model of the WEM Procedure: Distributed Energy Resource (DER) Register Information. The table contains additional technical information, including the API field name, permitted value and value ranges, the provided values where a data field 'applies to category' is not relevant, and details of the error codes to be resolved. This information must be provided when using the **Create DER Installation record** and the **Update DER Installation** API .

The table provides API details applicable to the API DER Installation submission payloads when:

- Creating a new Installation record (**Create DER Installation record -** POST API call method).

- Submitting updated DER Generation information if the information is not submitted, incomplete, inaccurate (**Update DER Installation** - PUT API call method).

- Resolving associated validation exception responses and error codes returned in the API response. For further descriptions of the error and exception codes, see **Appendix C: Validation Errors**.

Note: Permitted values are case sensitive and enumerated requiring values to be provided exactly as outlined below.

Table 17   WEM DER Installation API submission data fields

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
Data Model Level 1 – DER Installation								
NMI	nmi	Alpha-numeric - string(10)	All - Mandatory Field	8001000000 to 8020999999 or WAAA000000 to WAAAZZZZZZ excluding WAAAW	The unique National Metering Identifier allocated by the Network Operator for each Connection Point where the DER installation has been installed.	1020 – Length must be 10.	1010 – NMI does not exist in DER Register database. 1013 – Installation has already been created. 1015 – Installation has not been created for this NMI. 1021 – Must have a value (and not Null).	
Connection Agreement Job Number	jobNumber	Alpha-numeric - string(30)	All - Mandatory Field	This identifier is specified by the Network Operator as per its connection process.	The Unique identifier associated with the Network Operator's Connection Agreement for the approved works. The job number must be unique, it must not have been submitted before for a different NMI. **Note –** If a Connection Agreement was not required for the addition of new DER Equipment at the installation, this field is to be populated with the NMI.	1020 – Length must be between 1 and 30.	1000 – Job number already in use. 1021 – Must have a value (and not Null).	

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
Approved DER Generation Capacity	approvedCapacity	Numeric – number(8,3)	All - Mandatory Field	0 ≤ value ≤10,000	The total approved DER Generation Capacity in kVA as approved by the Network Operator and as stated in the associated Connection Agreement. Where DER Generation Capacity is not applicable a value of 0 is to be provided. **Note** – A 2040 error will occur if the installed equipmentInjectionCapacity provided is greater than the approvedCapacity provided,	1020 – Incorrect format, must be numeric (8,3). 1020 – must be between 0 to 10,000.	1021 – Must have a value (and not Null).	2040 – Review Data: installed injection capacity greater than approved capacity.
DER Load Capacity	loadCapacity	Numeric – number(8,3)	All - Mandatory Field	0 ≤ value ≤10,000	The total DER Load Capacity in kVA is the total Load Capacity at the installation (NMI). The sum of all the equipment withdrawal capacities provided (which can include storage inverters, controllable loads, hybrid inverters and EVSE). Where DER Load Capacity is not applicable a value of 0 is to be provided. **Note -** A 2040 error will occur if the installed equipmentWithdrawalCapacity provided is greater than the loadCapacity provided.	1020 – Incorrect format, must be numeric (8,3). 1020 – must be between 0 to 10,000.	1021 – Must have a value (and not Null).	2040 – Review Data: installed withdrawal capacity greater than load capacity.
Export Limit	exportLimitkW	Numeric – number(8,3)	All - Mandatory Field	0 ≤ value ≤10,000	The maximum amount of power (kW) that can be exported (sent out) through the Connection Point (NMI) .	1020 – Incorrect format, must be numeric (8,3).	1021 – Must have a value (and not Null). 1130 – Export limit exceeds	

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
					Where an Export Limit is applied, the Export Limit provided must be equal to or be less than the Approved DER Generation Capacity. Where there is no Export Limit applied the Approved DER Generation Capacity is to be provided.	1020 – must be between 0 and 10,000.	approved capacity.	
Import Limit	importLimitkW	Numeric – number(8,3)	All - Mandatory Field	0 ≤ value ≤10,000	The maximum amount of power that can be imported (drawn) from the load, through the Connection Point (kW). Where an Import Limit is applied, the Import Limit provided must be equal to or be less than the DER Load Capacity. Where there is no Import Limit applied, the DER Load Capacity is to be provided.	1020 – Incorrect format, must be numeric (8,3). 1020 - must be between 0 and 10,000.	1021 – Must have a value (and not Null). 1131 – Import Limit exceeds load capacity.	
Number of Phases Available	availablePhasesCount	Numeric - number(1)	All - Mandatory Field	1, 2, 3	The number of phases available for the installation of DER. Either 1, 2 or 3 phases must be provided.	1020 – Must be one of: 1, 2, 3.	1021 – Must have a value (and not Null).	
Number of Phases with DER Installed	installedPhasesCount	Numeric - number(1)	All - Mandatory Field	1, 2, 3	The number of phases that DER is connected to. Either 1, 2 or 3 phases must be provided.	1020 – Must be one of: 1, 2, 3.	1021 – Must have a value (and not Null).	
Islandable Installation	islandableInstallation	Text - string(3)	All - Mandatory Field	Yes, No	Identifies small generating units designed with the ability to operate in an islanded mode, or as an uninterruptible power supply.	1020 – Must be one of: Yes, No.	1021 – Must have a value (and not Null).	

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
					Either Yes or No must be provided.			
Central Protection and Control	centralProtectionControl	Text - string(3)	All - Mandatory Field	Yes, No	For DER installations where the Network Operator specifies the need for additional forms of protection. Either Yes or No must be provided. **Note:** This selection and the subsequent settings below should be consistent with the Network Operator's technical requirements for connection as applied at the Connection Point (for example, for Small Generating Units greater than 30 kVA).	1020 – Must be one of: Yes, No.	1021 – Must have a value (and not Null).	
The below protection and control sub-category data fields are to capture the different categories of central protection in use for Small Generating Units and Storage Works. Where the Network Operator has required the Small Generating Unit or Storage Works to install central protection equipment, and subsequently provided "Yes" for Central protection and control, the relevant protection and control sub-category data field(s) must be provided. The following applies: - Where "Yes" is provided for Central Protection and Control at least one of the Protection and Control modes must be provided otherwise this will result in error code 2023 being returned to the Network Operator. - For the remaining Central Protection modes which are not relevant a value of Null can be provided, or alternatively the data field can be not submitted as part of the API request. - Where 'No' is provided for Central Protection Control a value of Null can be provided, or alternatively the data field can be not submitted as part of the API request.								
Under-Frequency Protection (F<)	underFrequencyProtection	Numeric - number(4,2)	To be provided within the permitted value range where the 'Central	45 ≤ value ≤ 50	Protective function Under Frequency trigger (Hz).	1020 – Incorrect format, must be numeric (4,2).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
			Protection and Control' = Yes, the relevant protection settings must be provided.					Protection Control is Yes. 2024 – Review Data: Must be between 45 and 50.
Under-Frequency Protection Delay (F<)	underFrequency ProtectionDelay	Numeric - number(4,3)		0 ≤ value ≤ 9.999	Under Frequency Protection trip delay time in seconds.	1020 – Incorrect format, must be numeric (4,3).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central Protection Control is Yes. 2024 - Review Data: Must be between: 0 and 9.999.
Over-Frequency Protection (F>)	overFrequencyP rotection	Numeric - number(4,2)		50 ≤ value ≤ 55	Protective function Over Frequency Protection trigger in Hz	1020 – Incorrect format, must be numeric (4,2).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central Protection Control is Yes. 2024 – Review Data: Must be between 50 and 55.
Over-Frequency Protection Delay (F>)	overFrequencyP rotectionDelay	Numeric - number(4,3)		0 ≤ value ≤ 9.999	Over Frequency Protection trip delay time in seconds.	1020 – Incorrect format, must be numeric (4,3).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								Protection Control is Yes.
								2024 – Review Data: Must be between 0 and 9.999
Under Voltage Protection (V<)	underVoltageProtection	Numeric - number(9,3)		0 ≤ value ≤ 999,999.999	Protective function Under voltage trigger in Volts (V).	1020 – Incorrect format, Must be numeric (9,3).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central Protection Control is Yes.
								2024 – Review Data: Must be between 0 and 999,999.999.
Under Voltage Protection Delay (V<)	underVoltageProtectionDelay	Numeric – number(4,3)		0 ≤ value ≤ 9.999	Under Voltage Protection trip delay time in seconds.	1020 – Incorrect format, must be numeric (4,3).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central Protection Control is Yes.
								2024 – Review Data: Must be between 0 and 9.999.
Over Voltage Protection (V>)	overVoltageProtection	Numeric – number(9,3)		0 ≤ value ≤ 999,999.999	Protective Over Voltage Protection voltage trigger in Volts (V).	1020 – Incorrect format, must be numeric (9,3).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								Protection Control is Yes.
								2024 – Review Data: Must be between 0 and 999,999.999.
Over Voltage Protection Delay (V>)	overVoltageProtectionDelay	Numeric - number(4,3)		0 ≤ value ≤ 9.999	Over Voltage Protection trip delay time in seconds.	1020 – Incorrect format, must be numeric (4,3).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central Protection Control is Yes.
								2024 – Review Data: Must be between 0 and 9.999.
Sustained Over Voltage	sustainedOverVoltage	Numeric - number(9,3)		0 ≤ value ≤ 999,999.999	Sustained Over Voltage protection voltage trigger in Volts (V).	1020 – Incorrect format, must be numeric (9,3).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central Protection Control is Yes.
								2024 – Review Data: Must be between 0 and 999,999.999.
Sustained Over Voltage Delay	sustainedOverVoltageDelay	Numeric - number(5,3)		10 ≤ value ≤ 20	Sustained Over Voltage protection trip delay time in seconds.	1020 – Incorrect format, must be numeric (5,3).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								Protection Control is Yes. 2024 – Review Data: Must be between 10 and 20.
Rate of Change of Frequency (RoCoF)	frequencyRateOfChange	Numeric - number(4,3)		0 ≤ value ≤ 4	Rate of Change of Frequency trip point (Hz/s).	1020 – Incorrect format, must be numeric (4,3). .		2023 – Review Data: At least one Protection and Control Modes must be provided if Central Protection Control is Yes. 2024 – Review Data: Must be between 0 and 4.
Voltage Vector Shift	voltageVectorShift	Numeric - number(4,2)		0 ≤ value ≤ 99.99	Trip angle (Deg.)	1020 – Incorrect format, must be numeric (4,2).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central Protection Control is Yes. 2024 – Review Data: Must be between 0 and 99.99.
Inter-Trip Scheme	interTripScheme	Text - string(100)		Free Text	Description of the form of inter-trip (e.g., from local substation).	1020 – Length must not exceed 100.		2023 – Review Data: At least one Protection and Control Modes must be provided if Central Protection Control is Yes.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
Neutral Voltage displacement	neutralVoltageDisplacement	Numeric - number(7,3)		0 <= value <= 9,999.999	Trip voltage in Volts (V)	1020 – Incorrect format, must be numeric (7,3).		2023 – Review Data: At least one Protection and Control Modes must be provided if Central Protection Control is Yes. 2024 – Review Data: Must be between 0 and 9,999.999.
Other	otherProtection	Text - string(100)		Free Text	Where relevant, the details which describe other types of protection settings applied by the Network Operator to the Small Generating Unit or Storage Works that are not listed in the above Protection and Control settings are to be provided.	1020 – Length must not exceed 100.		2023 – Review Data: At least one Protection and Control Modes must be provided if Central Protection Control is Yes.
Installer Identification	installerId	Alpha-numeric string(50)	All - Mandatory Field	Free Text	Unique identifier for the installer accountable for the installation, modification or removal in accordance with the NMI and the associated Connection Agreement 'Job number'. This identifier must match the installer's unique qualification number which is the electrical contractor's licence number.	1020 – Length must not exceed 50.		2023 – Review Data: Data not provided (must have a value).
Comments	comments	Text - string(100)	All – Optional Field	Free Text	Optional free text area to provide any relevant comments in relation to the DER Installation Level 1 information. **Note -** A value of Null is to be provided if not utilising this optional field. Alternatively, the	1020 – Length must not exceed 100.		

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
					data field can be not submitted as part of the API request.			
Data Model Level 2 – AC Connection								
AC Connections	acConnections	Array – array of objects	All – Mandatory field	Array of objects	This field is an array of the AC Connection data.		1030 – DER installation information missing. Please provide an AC Connection for this NMI.	
AC Connection ID	connectionId	Numeric integer - number(15)	All – System Generated	The existing connectionId that has been previously generated by AEMO's system. **Note -** This field is only provided when updating existing installations.	Unique identifier for each AC Connection This is system-generated by AEMO. **Note** - AEMO's system generates a connectionId when the connection is first created and this is provided to the Network Operator in the API response. **Note -** Subsequently, when a change is submitted by the Network Operator to update DER Register data, the same Connectionid provided by AEMO to the Network Operator when the initial AC Connection was created is to be submitted by the Network Operator.	1020 – Must be between: 0 and 999,999,999,999,999	1050 – Invalid AC Connection identifier. (connectionId must align to current connectionId).	
Network Operator Asset Identifier	nspConnectionId	Text – string(50)	All – Mandatory Field	Free Text - The unique DER asset identifier.	Unique DER asset identifier used by the Network Operator to identify the DER Equipment described by the respective Level 2 information. The Asset Identifier provided by the Network Operator to AEMO	1020 – Length must not exceed 50.		2023 – Review Data: Data not provided (must have a value).

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
					must align to the Asset Identifier that is used in other operational processes (for example, identifiers provided to a retailer to identify DER equipment).			
Commissioning Date	commissioningDate	Date – string (yyyy-mm-dd)	All – Mandatory Field	Date	The date the DER Equipment becomes Active. **Note -** The commissioning date can be in the past or current date. It should not be in the future or be provided as Null.	1020 – Must be a valid date with the format yyyy-mm-dd.	1021 – Must have a value (and not Null). 1070 – Invalid Commissioning Date Provided (cannot be in the future).	
DER Equipment Type	equipmentType	Text – string(30)	All – Mandatory Field	Battery Storage Inverter, Controllable Load, Hybrid Inverter, EVSE V2G, EVSE no V2G, Rotating Machine, Solar PV Inverter **Note** – Permitted Values are case sensitive and enumerated requiring the permitted values to be provided exactly as above.	Identifies the type of DER Equipment interacting with the AC electrical system. The DER Equipment Type must be provided as per the permitted values. **Note** - For AC Connection records created prior to 2 October 2023 with DER Equipment Types of Inverter and Other, these will be retained and can be updated. For DER Equipment created on or after 2 October 2023 Equipment Types of 'Inverter' or 'Other' will not be valid.	1020 – Length must not exceed 30.	1020 – Content must be in the correct format (One of the Equipment Type as per Permitted Values). 1021 – Must have a value (and not Null).	
DER Equipment Unit Count	count	Numeric integer - number(5)	All – Mandatory Field	1 <= value <= 99,999	The number of DER Equipment Units with identical attributes. **Note** - Where more than one unit of DER Equipment is installed and each unit has identical attributes, most of the Level 2 information can be provided once, with the DER Equipment Unit Count used	1020 – Must be between: 1 and 99,999.	1021 – Must have a value (and not Null).	

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
					provided to describe the combined installation. The only exception to this is the Serial Number which must be provided for each individual DER Equipment Unit.			
DER Equipment Status	status	Text – string(14)	All – Mandatory Field	Active, Decommissioned	The equipment's operating status. • Active: Equipment that is physically installed and operating. • Decommissioned: Equipment that is no longer operating. To maintain data integrity, when DER Equipment is Decommissioned, the Network Operator must submit a change to update the DER Equipment Status to Decommissioned. **Note -** The Device Status must also be updated to Decommissioned if the DER Equipment linked to the DER Device is Decommissioned and if the NMI Status has also changed from Active to Extinct.	1020 – Must be one of: Active, Decommissioned	1021 – Must have a value (and not Null).	
Equipment Injection Capacity	equipmentInjectionCapacity	Numeric - number(7,3)	To be provided with where the DER Equipment Type = • Battery Storage Inverter Or • Hybrid Inverter Or	0 <= value <= 1000 **Note -** To be provided with a value > than 0 where the conditions in the 'applies to category' column are applicable.	The rated output power that is listed on each unit as specified by the manufacturer (kVA) that can be sent out into the AC electrical system. This value refers to the injection capacity of a single unit, a single generation rated capacity of each unique DER Generation equipment.	1020 – Incorrect format, must be numeric (7,3).		2023 – Review Data – Data not provided (must have a value where the associated DER Equipment Type is one of Hybrid Inverter, Battery Storage Inverter, EVSE V2G, Rotating Machine,

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
			• EVSE V2G Or • Rotating Machine Or • Solar PV Inverter		**Note -** A value of 0 is to be provided where the DER Equipment Type does not align to the DER Equipment Types outlined in the 'applies to category' column, for DER Equipment Types of Controllable Load and EVSE no V2G. **Note** - This field replaces historical field Inverterdevicecapacity which was required to be provided prior to 2 October2023 where the DER Equipment Type = Inverter. The equipmentinjectioncapacity is to also be applied to historical DER Equipment Type 'Inverter'.			Solar PV Inverter Inverter). 2024 – Review Data: The Equipment Injection Capacity has been provided as 0 (Where the associated DER Equipment Type is one of: Battery Storage Inverter, Hybrid Inverter, EVSE V2G, Rotating Machine, Solar PV Inverter). 2024 – Review Data: Must be between: 0 and 1,000.
Equipment Withdrawal Capacity	equipmentWithdrawalCapacity	Numeric - number(73)	To be provided where the DER Equipment Type = • Battery Storage Inverter Or • Controllable Load Or • Hybrid Inverter Or • EVSE V2G	0 <= value <= 1000 **Note -** To be provided with a value > than 0 where the conditions in the 'applies to category' column are applicable.	The rated consumption power that is listed on each unit as specified by the manufacturer (kW) that can be taken from the AC electrical system. This value refers to the withdrawal capacity of a single unit, a single load rated capacity of each unique DER load equipment. **Note -** The equipment withdrawal capacity is to be lower than or equal to the load capacity. **Note -** A value of 0 is to be provided where the DER Equipment Type does not align to the DER Equipment Types	1020 – Incorrect format, must be numeric (7,3).		2023 – Review Data – Data not provided (must have a value where the associated DER Equipment Type is one of, Battery Storage Inverter, Controllable Load, Hybrid Inverter, EVSE V2G, EVSE no V2G,). 2024 – Review Data: The Equipment Withdrawal

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
			Or • EVSE no V2G		outlined in the 'applies to category' column.			Capacity has been provided as 0. (Where DER Equipment Type is one of Hybrid Inverter, Battery Storage Inverter, EVSE V2G,EVSE no V2G, Controllable Load). 2024 – Review Data: Must be between: 0 and 1,000.
Electric Vehicle Supply Equipment (EVSE) Ownership Status	evseOwnership Status	Text – string (20)	To be provided where the DER Equipment Type = • EVSE V2G Or EVSE no V2G	The ownership status is to be provided as either: • Private • Public • Fleet	The ownership status is used to identify if the Electric Vehicle Supply Equipment (EVSE) is owned for Private, Public or Fleet use. **Note -** A value of Null is to be provided where the DER Equipment Type is not EVSE V2G or ESVE no V2G. Alternatively the data field can be not submitted as part of the API request.	1020 – Must be one of: Private, Public, Fleet.		2023 – Review Data: Must have a value of Private, Public or Fleet (Where DER Equipment Type is one of: EVSE V2G, EVSE no V2G).
Authorised Agent	authorisedAgent	Text – string (50)	To be provided for all DER Equipment Types where an Authorised Agent is enabled.	Free Text **Note** - Where enabled, the name of the entity responsible for facilitating the control of the DER Equipment.	As defined in the Network Operator's connection and DER management requirements. **Note** - A value of Null is to be provided where an Authorised Agent is not enabled. Alternatively, the data field can be not submitted as part of the API request.	1020 – Length must not exceed 50.		2023 – Review Data: Data Not Provided (Must have a value where DER Management Method has a value).

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
DER Management Method	managementMethod	Text – String (100)	To be provided for all DER Equipment Types where the DER Management Method is installed.	Free Text **Note -** Where installed, the DER Management Method applied to the DER Equipment (e.g., meter-based isolation, internet based).	Where an Authorised Agent is enabled, it is expected that the DER Management Method applied is provided. **Note** - A value of Null is to be provided where an Authorised Agent is not enabled as it expected a DER Management Method is only installed where an Authorised Agent is enabled. Alternatively, the data field can be not submitted as part of the API request.	1020 – Length must not exceed 100.		2023 – Review Data: Data Not Provided, must have a value where authorisedAgent has a value.
The below additional forms of protection are to provide additional information for protection equipment the Network Operator may require for the AC Connection equipment, where these are not described by other Level 1 data fields. Where these additional forms of protection schemes are not relevant the value of Null is to be provided. Alternatively, the data field can be not submitted as part of the API request.								
Rate of Change of Frequency (RoCoF)	frequencyRateOfChange	Numeric - number(4,3)	To be provided within the permitted value ranges where these schemes are applied as additional forms of protection the Network Operator may require for the DER Equipment, where these are not described by other Level 1 data fields.	0 ≤ value ≤ 4	Rate of change of frequency to be provided in (Hz/s).	1020 – Incorrect format, must be numeric (4,3).		2024 – Review Data: Must be between: 0 and 4.
Voltage Vector Shift	voltageVectorShift	Numeric - number(4,2)		0 ≤ value ≤ 99.99	The Trip angle (Deg.)	1020 – Incorrect format, must be numeric (4,2).		2024 – Review Data: Must be between: 0 and 99.99.
Inter-trip Scheme	interTripScheme	Text – string(100)		Free Text	The description of the form of inter-trip (e.g., from local substation).	1020 – Length must not exceed 100.		
Neutral Voltage Displacement	neutralVoltageDisplacement	Numeric - number(7,3)		0 <= value <= 9,999.999	The trip voltage to be provided in Volts (V).	1020 – Incorrect format, must be numeric (7,3).		2024 – Review Data: Must be

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								between: 0 and 9,999.999.
Equipment Serial Number	serialNumbers	Array – string array	To be provided for all DER Equipment Types.	Free Text	The Equipment Serial Number. A serial number must be provided for each individual DER Equipment unit. **Note –** a serial number must be provided for each unit. For example, if DER Equipment Unit Count = 3, then 3 serial numbers must be provided. **Note –** The maximum number of serial numbers permissible is 99,999.	1020 – Must be an array of strings, with 0 to 99,999 values.		2023 – Missing Information (Cannot contain blank serials). 2023 – Review Data: Data Not Provided (Must provide at least 1 serial number)
Equipment Manufacturer	manufacturerName	Text – string(120)	To be provided for all DER Equipment Types.	May be aligned to available product databases or entered as free text.	The name of the Equipment Manufacturer.	1020 – Length must not exceed 120.		2023 – Review Data: Must have a value when Equipment Status is Active.
Equipment Model Number	modelNumber	Text – string(120)			The Equipment Model number of the inverter.	1020 – Length must not exceed 120.		
Equipment Series	equipmentSeries	Text – string(50)			The Equipment Series.	1020 – Length must not exceed 50.		
The Standards which apply to the DER Equipment	equipmentStandard	Text – string(150)	To be provided for all DER Equipment Types.	Free Text **Note –** Examples include: • ASNZS4777.2:2015 • ASNZS.4777.2:2020 • IEC62109-1 • IEC62019-2 • IEC61851-25:2020 • IEC62196-6:20202	The Standard(s) the DER Equipment is manufactured, tested and installed to comply with in accordance with the Standards in effect on the commissioning date of the equipment (e.g., communication standards, grid connection standards, supply equipment standards, inverter standards).	1020 – Length must not exceed 150.		

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
Region Setting	regionSetting	Text String (1)	To be provided where the DER Equipment Type = • Battery Storage Inverter Or • Hybrid Inverter Or • EVSE V2G Or • Solar PV Inverter where the Australian Standard AS/NZS4777.2:2020 applies to inverter based DER Equipment commissioned from the 18 December 2021.	A, B, C	Per the Australian Standard AS/NZS.4777.2:2020 'Australia B' is the applicable region to be provided for the South West Interconnected System. **Note –** A value of Null is to be provided where the DER Equipment Type = Controllable Load, EVSE no V2G, Rotating Machine. Alternatively, the data field can be not submitted as part of the API request. **Note –** Where the Australian Standard AS/NZS4777.2:2020 does not apply (e.g. AS/NZS4777.2.2015 applies to inverter based equipment commissioned prior to 18 December 2021) a value of Null is to be provided. Alternatively, the data field can be not submitted as part of the API request.	1020 – Must be one of: A, B, C.		2023 – Review Data: Region Setting Must be provided as Region B if Commissioning Date is > than or = to 18.12.2021 (where DER Equipment Type = one of Battery Storage Inverter, Hybrid Inverter, Solar PV Inverter or, EVSE V2G). 2023 – Review Data: Region Setting has been provided and Commissioning Date is < than 18.12.2021.
Additional Network Operator Requirements	additionalRequirements	Text – String (200)	To be provided where the 'Region Setting' is provided and additional or alterations of prescribed settings in the relevant Standard have been imposed on the DER Equipment.	Free Text Examples of variations and the level of information to be provided: • Example 1: AS/NZS4777.2:2020, 3.3.2.3 Volt-var response mode, Vv1 = 210 V, Q at Vv1 = 20 %, Vv2 = 215 V, Q at Vv2). • Example 2: AS/NZS4777.2:2020	Requirement descriptions must include the Standard name, version, paragraph reference number, setpoint naming as referenced in the relevant Standard and the divergent set point values. **Note –** A value of None is to be provided where the Region Setting is applicable and additional Network Operator Requirements are not applied. **Note -** A value of Null is to be provided, alternatively the data field can be not submitted as part of the API where the Region	1020 – Length must not exceed 200.		

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
				, 4.5.3 Sustained operation for frequency variations, Fllco = 49.8 Hz, Fpmax = 48.3 Hz).	Setting is not relevant. (i.e. commissioned before 18 December 2021)			

The following data field categories and sub-categories are as described in the Australian Standard AS/NZS4777.2:2015 – 'Grid Connection of Energy Systems via Inverter' must be provided where this Standard is relevant to the AC Connection equipment (for example for equipment commissioned prior to 18 December 2021).

The following applies:

- Where the Australian Standard AS/NZS4777.2.2020 applies and the Region Setting has been provided, a value of Null is to be provided. Alternatively, the data field can be not submitted as part of the API request.

- A value of Null is to be provided where the applies to category criteria is not applicable (e.g. does not align to the DER Equipment Type). Alternatively, the data field can be not submitted as part of the API request.

- A value of Null is to be provided for the subsequent operating modes where a Response Mode = Not Enabled (e.g. . V1 to P at V4 where the Response Mode / volt-watt response = Not Enabled. Alternatively the data field can be not submitted as part of the API request.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
$V_{nom-max}$ (sustained Operation Over Voltage Limit)	sustainOpOvervoltLimit	number(6,3)	To be provided within the permitted value ranges where the DER Equipment Type = • Battery Storage Inverter Or • Hybrid Inverter Or • Solar PV Inverter	244 ≤ value ≤ 258	Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the $V_{nom-max}$. To be provided in Volts (V).	1020 – Incorrect format, must be numeric (6,3).		2023 – Review Data: Data Not Provided (Must be provided where Region Setting is not applied (where DER Equipment Type is one of: Hybrid Inverter, Battery Storage or Solar PV Inverter). 2024 – Review Data: Must be between: 244 and 258.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
F_{stop} (over-frequency)	stopAtOverFreq	number(4,2)		51 ≤ value ≤ 52	Frequency (stop) to be provided In Hz.	1020 – Incorrect format, must be numeric (4,2).		2023 – Review Data: Data Not Provided (Must be provided where Region Setting is not applied (where DER Equipment Type is one of: Hybrid Inverter, Battery Storage or Solar PV Inverter). 2024 – Review Data: Must be between: 51 and 52.
$F_{stop-CH}$ (under frequency)	stopAtUnderFreq	number(4,2)		47 ≤ value ≤ 49	Frequency (stop) to be provided In Hz.	1020 – Incorrect format, must be numeric (4,2).		2023 – Review Data: Data Not Provided (Must be provided where Region Setting is not applied (where DER Equipment Type is one of: Hybrid Inverter, Battery Storage or Solar PV Inverter). 2024 – Review Data: Must be between: 47 and 49.
Inverter / DRED Interaction	dredInverterInteraction	Text – string(3)		Yes, No	Indicates if the inverter is interacting with a demand response enabling device (DRED).	1020 – Must be one of: Yes, No.		2023 – Review Data: Data Not Provided (Must be provided where Region Setting is not applied (where DER

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								Equipment Type is one of: Hybrid Inverter, Battery Storage or Solar PV Inverter).
Voltage Response Mode – volt-watt response	invVoltWattResp Mode	Text -string(15)		Enabled, Not Enabled	Indicates if the operating mode is enabled or not.	1020 – Must be one of: Enabled, Not Enabled.		2023 – Review Data: Data Not Provided (Must be provided where Region Setting is not applied (where DER Equipment Type is one of: Hybrid Inverter, Battery Storage or Solar PV Inverter).
V1	invWattRespV1	Numeric - number(6,3)	To be provided within the permitted value range where the Voltage Response Mode / Volt-Watt response = Enabled.	200 ≤ value ≤ 300	To be provided in Volts (V).	1020 – Incorrect format, must be numeric (6,3).		2023 – Review Data: Must have a value when invVoltWattResp Mode is Enabled. 2023 - Review Data: must have a value between 200 and 300 where invVoltWattRespMode is Enabled.
V2	invWattRespV2	Numeric - number(6,3)		216 ≤ value ≤ 230				2023 – Review Data: Must have a value when invVoltWattResp Mode is Enabled). 2023 - Review Data: must have a value between 216 and 23

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								0 where invVoltWattRespMode is Enabled.
V3	invWattRespV3	Numeric – number(6,3)		235 ≤ value ≤ 255				2023 – Review Data: Must have a value when invVoltWattRespMode is Enabled. 2023 - Review Data: must have a value between 235 and 255 where invVoltWattRespMode is Enabled.
V4	invWattRespV4	Numeric - number(6,3)		245 ≤ value ≤ 265				2023 – Review Data: Must have a value when invVoltWattRespMode is Enabled. 2023 - Review Data: must have a value between 245 and 265 where invVoltWattRespMode is Enabled.
P at V1	invWattRespPAtV1	Numeric - number(6,3)		0 ≤ value ≤ 100	To be provided in (%).	1020 – Incorrect format, must be numeric (6,3).		2023 – Review Data: Must have a value when invVoltWattRespMode is Enabled. 2023 - Review Data: must have a value between 0 and 100 where invVoltWattR
P at V2	invWattRespPAtV2	Numeric - number(6,3)		0 ≤ value ≤ 100				
P at V3	invWattRespPAtV3	Numeric - number(6,3)		0 ≤ value ≤ 100				

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								espMode is Enabled.
P at V4	invWattRespPAt V4	Numeric - number(5,3)		0 ≤ value ≤ 20		1020 – Incorrect format, must be numeric (5,3).		2023 – Review Data: Must have a value when invVoltWattResp Mode is Enabled. 2023 - Review Data: must have a value between 0 and 20 where invVoltWattRe spMode is Enabled.
Voltage Response Mode– volt-var response	invVoltVarResp Mode	Text – string(15)	To be provided where the DER Equipment Type = • Battery Storage Inverter Or • Hybrid Inverter Or • Solar PV Inverter	Enabled, Not Enabled	Indicates if the operating mode is enabled or not.	1020 – Must be one of: Enabled, Not Enabled.		2023 – Review Data: Data Not Provided (Must be provided where Region Setting is not applied (where DER Equipment Type is one of: Hybrid Inverter, Battery Storage or Solar PV Inverter).
V1	invVarRespV1	Numeric - number(6,3)	To be provided within the permitted value range where the Voltage Response Mode / volt-var Response = Enabled	200 ≤ value ≤ 300	To be provided in Volts (V), .	1020 – Incorrect format, must be numeric (6,3).		2023 – Review Data: Must have a value when invVoltVarRespM ode is enabled).
V2	invVarRespV2	Numeric - number(6,3)		200 ≤ value ≤ 300				2023 - Review Data: must have a value between 200 and 300 where invVoltVa
V3	invVarRespV3	Numeric - number(6,3)		200 ≤ value ≤ 300				
V4	invVarRespV4	Numeric - number(6,3)		200 ≤ value ≤ 300				

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								rRespMode is Enabled.
Q at V1	invVarRespQAtV1	Numeric - number(5,3)		0 ≤ value ≤ 60	To be provided in (%),	1020 – Incorrect format, must be numeric (5,3).		2023 – Review Data: Must have a value when invVoltVarRespMode is enabled). 2023 - Review Data: must have a value between 0 and 60 where invVoltVarRespMode is Enabled.
Q at V2	invVarRespQAtV2	Numeric - number(6,3)		-100 ≤ value ≤ 100		1020 – Incorrect format, must be numeric (6,3).		2023 – Review Data: Must have a value when invVoltVarRespMode is enabled). 2023 - Review Data must have a value between -100 and 100 where invVoltVarRespMode is Enabled.
Q at V3	invVarRespQAtV3	Numeric - number(6,3)		-100 ≤ value ≤ 100				2023 – Review Data: Must have a value when invVoltVarRespMode is enabled). 2023 - Review Data: must have a value between -100 and 100 wher

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								e invVoltVarResp Mode is Enabled.
Q at V4	invVarRespQAt V4	Numeric - number(5,3)		-60 ≤ value ≤ 0		1020 – Incorrect format, must be numeric (5,3).		2023 – Review Data: Must have a value when invVoltVarRespM ode is enabled). 2023 - Review Data: must have a value bet ween - 60 and 0 where in vVoltVarRespMod e is Enabled.
Reactive Power Mode	invReactivePow erMode	Text – string(15)	To be provided where the DER Equipment Type = • Battery Storage Inverter Or • Hybrid Inverter Or • Solar PV Inverter	Enabled, Not Enabled	Indicates if the operating mode is enabled or not. **Note** – to be provided as: • Enabled where the InvVoltVarRespMode or/and InvVoltWattRespMode is Not Enabled. • Not Enabled where the InvVoltVarRespMode or/and InvVoltWattRespMode is Enabled.	1020 – Must be one of: Enabled, Not Enabled.		2023 – Review Data: Must have a value of Not Enabled if invVoltVarRespM ode or invVoltWattResp Mode is enabled). 2023 – Review Data: Must have a value of Enabled if invVoltVarRespM ode or invVoltWattResp Mode is Not Enabled).
Fixed Reactive Power	invFixReactiveP ower	Numeric - number(6,3)	To be provided within the permitted value range where the Reactive Power Mode = Enabled.	-100 ≤ value ≤ 100	To be provided in % output of the system. -ve sign refers to sink	1020 – Incorrect format, must be numeric (6,3).		2023 – Review Data: Must have a value when invReactivePower Mode is Enabled.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								2023 - Review Data: must have a value between -100 and 100 where invReactivePowerMode is Enabled.
Fixed Power Factor Mode	fixPowerFactorMode	Text – string(15)	To be provided where the DER Equipment Type = • Battery Storage Inverter Or • Hybrid Inverter Or • Solar PV Inverter	Enabled, Not Enabled	Indicates if the operating mode is enabled or not. **Note –** To be provided as: • Enabled where the InvVoltVarRespMode or/and InvVoltWattRespMode is Not Enabled. • Not Enabled where the InvVoltVarRespMode or/and InvVoltWattRespMode is Enabled.	1020 – Must be one of: Enabled, Not Enabled.		2023 – Review Data: Must have a value of Not Enabled if invVoltVarRespMode or invVoltWattRespMode is enabled. 2023 – Review Data: Must have a value of Enabled if invVoltVarRespMode or invVoltWattRespMode is Not Enabled.
Fixed Power Factor	fixPowerFactor	Numeric - number(4,3)	To be provided where the Fixed Power Factor Mode = Enabled.	0.8 ≤ value ≤ 1	To be provided within the permitted value range.	1020 – Incorrect format, must be numeric (4,3).		2023 – Review Data: Must have a value when fixPowerFactorMode is Enabled. 2023 - Review Data: must have a value between 0.8 and 1 where fixPowerFactorMode is Enabled.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
Fixed Power Factor Quadrant	fixPowerFactorQuad	Text – string(10)		Source, Sink	To be provided where as either Source or Sink.	1020 – Must be one of: Source, Sink.		2023 – Review Data: Must have a value of Source, Sink, if fixPowerFactorMode is Enabled.
Power Factor Curve / Power Response Mode	powerRespMode	Text – string(15)	To be provided where the DER Equipment Type = • Battery Storage Inverter Or • Hybrid Inverter Or • Solar PV Inverter	Enabled, Not Enabled	Indicates if the operating mode is enabled or not. **Note –** To be provided as: • Enabled where the InvVoltVarRespMode or/and InvVoltWattRespMode is Not Enabled. • Not Enabled where the InvVoltVarRespMode or/and InvVoltWattRespMode is Enabled.	1020 – Must be one of: Enable, Not Enabled.		2023 – Review Data: Must have a value of Not Enabled if invVoltVarRespMode or invVoltWattRespMode is enabled. 2023 – Review Data: Must have a value of Enabled if invVoltVarRespMode or invVoltWattRespMode is Not Enabled.
P1	referencePointP1	Numeric - number(6,3)	To be provided within the permitted value range where the Power Factor Curve / Power Response Mode = Enabled.	0 ≤ value ≤ 100	The Reference Point for P1 (kW) To be provided in (%).	1020 – Incorrect format, must be numeric (6,3).		2023 – Review Data: Must have a value when powerRespMode is Enabled. 2023 - Review Data: must have a value between 0 and 100 where powerRespMode is Enabled.
P2	referencePointP2	Numeric - number(6,3)		0 ≤ value ≤ 100	The Reference Point for P2 (kW) To be provided in (%).	1020 – Incorrect format, must be numeric (6,3).		2023 – Review Data: Must have a value when

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								powerRespMode is Enabled. 2023 - Review Data: must have a value between 0 and 100 where powerRespMode is Enabled.
Power Factor at P1	powerFactorAtP1	Numeric - number(4,3)		0.9 ≤ value ≤ 1		1020 – Incorrect format, must be numeric (4,3).		2023 – Review Data: Must have a value when powerRespMode is Enabled. 2023 - Review Data: must have a value between 0.9 and 1 where powerRespMode is Enabled.
Power Factor Quadrant at P1	powerFactorQuadAtP1	Text – string(10)		Source, Sink	To be provided as either Source or Sink.	1020 – Must be one of: Source, Sink.		2023 – Review Data: Must have a value of Source, Sink if PowerRespMode is Enabled.
Power Factor at P2	powerFactorAtP2	Numeric – number(4,3)		0.9 ≤ value ≤ 1		1020 – Incorrect format, must be numeric (4,3).		2023 – Review Data: Must have a value when PowerRespMode is Enabled. 2023 - Review Data: must have a value between 0.9 and 1 where

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								powerRespMode is Enabled.
Power Factor Quadrant at P2	powerFactorQuadAtP2	Text – string(10)		Source, Sink		1020 – Must be one of: Source, Sink.		2023 – Review Data: Must have a value of Source, Sink if PowerRespMode is Enabled.
Power Rate Limit Mode / Changes in AC Operation and Control	powerRateLimitMode	Text – string(15)	To be provided where the DER Equipment Type = • Battery Storage Inverter Or • Hybrid Inverter Or • Solar PV Inverter	Enabled, Not Enabled	Indicates if the operating mode is enabled or not.	1020 – Must be one of: Enabled, Not Enabled.		2023 – Review Data: Must be provided as Enabled or Not Enabled (where Region Setting is not provided and DER Equipment Type is one of: Hybrid Inverter, Battery Storage or Solar PV Inverter).
Power Ramp Rate	powerRampRate	Numeric - number(6,3)	To be provided within the permitted value range where the Power Rate Limit Mode / Changes in AC Operation and Control = Enabled.	5 ≤ value ≤ 100	To be provided in W_{Gra}, the power rate limit range shall be adjustable in the range of 5 – 100 of rated power per minute.	1020 – Incorrect format, must be numeric (6,3).		2023 -Review Data: must have a value when powerRateLimitMode is Enabled. 2023 – Review Data: Must have a value between 5 and 100 where powerRampRate is Enabled.

The following data field categories and sub-categories must be provided where relevant for DER Equipment Type – Rotating Machine and Other.

The following applies:

• A value of Null is to be provided where the DER Equipment Type does not = Rotating Machine or Other. Alternatively, the data field can be not submitted as part of the API request.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
• A value of Null is to be provided where the applies to category criteria is not applicable, for example: where a data field = Not Enabled and is only required to be provided where it meets the condition of being Enabled. A Null value is to be provided, alternatively, the data field can be not submitted as part of the API request.								
Rotating Machine Reactive Power Regulation	reactivePowerRegulation	Text – string(20)	To be provided where the DER Equipment Type = Rotating Machine.	None, Voltage Droop, Fixed Power Factor	Indicates if the operating mode is enabled or not.	1020 – Must be one of: None, Voltage Droop, Fixed Power Factor.		2023 – Review Data: Must be provided as None, Voltage Droop or Fixed Power Factor. ***Note** (if equipment type = Rotating Machine or Other)
Voltage Set Point	voltageSetPoint	Numeric - number(9,3)	To be provided within the permitted value range where the Rotating Machine Voltage / Reactive Power Regulation = Voltage Droop.	0 ≤ value ≤ 999,999.999	To be provided in either % Nominal Voltage or Volts. **Note –** If the Voltage Set Point unit is provided in %, then the Voltage Set Point provided must not be more than 100 or it will result in an error code 1140 ' Invalid Submission: Value is percentage, maximum is 100%' being returned to the Network Operator.	1020 – Incorrect format, must be numeric (9,3).	1140 – Invalid Submission: Value is percentage, maximum is 100%.	2023 – Review Data: Must be provided if reactivePowerRegulation is Voltage Droop. 2024 – Review Data: Must be between 0 and 999,999.999.
Voltage Set Point Unit	voltageSetPointUnit	Text – string(1)		% or (V) Volts	To be provided in either % or (V) Volts.	1020 – Must be one of: %, V.		2023 – Review Data: Must be provided if reactivePowerRegulation is Voltage Droop.
Dead-band	deadband	Numeric - number(6,3)		0 ≤ value ≤ 100	To be provided in ± x%.	1020 – Incorrect format, must be numeric (6,3).		2023 – Review Data: Must be provided if reactivePowerRegulation = Voltage Droop.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								2024 – Review Data: Must be between: 0 and 100.
Droop	droop	Numeric - number(5,3)		0 <= value <= 99.999	To be provided in %.	1020 – Incorrect format, must be numeric (5,3).		2023 – Review Data: Must be provided if reactivePowerRegulation is Voltage Droop. 2024 – Review Data: Must be between: 0 and 99.999.
Base for droop	baseForDroop	Numeric - number(8,3)		0 ≤ value ≤ 99,999.999	To be provided in kVA.	1020 – Incorrect format, must be numeric (8,3).		2023 – Review Data: Must be provided if reactivePowerRegulation is Voltage Droop. 2024 – Review Data: Must be between: 0 and 99,999.999.
Reactive Power Source Limit	reactivePowerSourceLimit	Numeric-number(8,3)		0 ≤ value ≤ 99,999.999	To be provided in kVAr.			2023 – Review Data: Must be provided if reactivePowerRegulation is Voltage Droop. 2024 – Review Data: Must be between: 0 and 99,999.999.
Reactive Power Sink Limit	reactivePowerSinkLimit	Numeric - number(8,3)		0 ≤ value ≤ 99,999.999	To be provided in kVAr.			2023 – Review Data: Must be

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								provided if reactivePowerRegulation is Voltage Droop. 2024 – Review Data: Must be between: 0 and 99,999.999.
Fixed Power Factor	reactiveFixPowerFactor	Numeric - number(4,3)	To be provided within the permitted value range where the Rotating Machine Voltage / Reactive Power Regulation = Fixed Power Factor.	0 ≤ value ≤ 1		1020 – Incorrect format, must be numeric (4,3).		2023 – Review Data: Must be provided if reactivePowerRegulation is Fixed Power Factor. 2024 – Review Data: Must be between: 0 and 1.
Fixed Power Factor Quadrant	reactiveFixPowerFactorQuad	Text – string(10)		Source, Sink		1020 – Must be one of: Source, Sink.		2023 – Review Data: Must be provided if reactivePowerRegulation is Fixed Power Factor.
Rotating Machine Ramp Rate	generatorRampRate	Text – string(15)	To be provided where the DER Equipment Type = Rotating Machine.	Enabled, Not Enabled	Indicates if the operating mode is enabled or not.	1020 – Must be one of: Enabled, Not Enabled.		2023 – Review Data: Data not provided (must have a value). ***Note** (if equipment type = Rotating Machine or Other).
Power Ramp Gradient	powerRampGradient	Numeric - number(6,3)	To be provided within the permitted value range where the Rotating Machine Ramp Rate = Enabled.	0 ≤ value ≤ 100	To be provided in %/minute.	1020 – Incorrect format, must be numeric (6,3).		2023 - Review Data: must have a value when generatorRampRate is Enabled.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
								2023 – Review Data: must have a value between 0 and 100 where generatorRampRate is Enabled.
Rotating Machine Frequency Response Mode	frequencySensitiveMode	Text – string(15)	To be provided where the DER Equipment Type = Rotating Machine.	Enabled, Not Enabled	Indicates if the operating mode is enabled or not.	1020 – Must be one of: Enabled, Not Enabled.		2023 – Review Data: Data not provided (must have a value). ***Note** (if equipment type = Rotating Machine or Other).
Frequency Dead-band	frequencyDeadband	Numeric - number(6,3)	To be provided within the permitted value range where the Rotating Machine Frequency Response Mode = Enabled.	0 ≤ value ≤ 999.99	To be provided in Hz.	1020 – Incorrect format, must be numeric (6,3). .		2023 – Review Data: Must be provided if frequencySensitiveMode is Enabled. 2024 – Must be between: 0 and 999.99.
Frequency Droop	frequencyDroop	Numeric - number(4,2)		0 ≤ value ≤ 99.99	To be provided in %.	1020 – Incorrect format, must be numeric (4,2).		2023 – Review Data: Must be provided if frequencySensitiveMode is Enabled. 2024 – Review Data: Must be between: 0 and 99.99.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
Data Model Level 3 – DER Device								
Devices	devices	Array – array of objects	All – Mandatory field		This field holds an AC Connections Device data records.		1031 – DER installation information missing. Please provide a Device for this AC Connection.	
AEMO Device Identifier	deviceId	Numeric - number(15)	All - System Generated	Null or an existing deviceId that has been previously generated by AEMO's system.	The Unique identifier for a single DER Device or a group of DER Devices with the same attributes. **Note –** When the Network Operator creates an initial DER Device record this is to be provided with a value of Null. AEMO's system auto generates a deviceId and this is provided by AEMO in the API response payload sent to the Network Operator. **Note –** Subsequently, when the Network Operator submit a change to update details associated, the same deviceid provided by AEMO to the Network Operator when the DER device was created is to be provided by the Network Operator. If it does not match this will result in an error code 1051 'Invalid Device Identifier' being returned to the Network Operator. If populated the deviceid must match the existing deviceid in the DER Register database.	1020 – Must be between: 0 and 999,999,999,999,999.	1051 – Invalid submission: Invalid Device identifier (deviceid must be null or align to current deviceid).	

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
Network Operator Asset Device Identifier	nspDeviceId	Text – string(50)	All – Optional Field	Free Text **Note** –The unique DER Asset Device Identifier that is used by the Network Operator.	This is an optional field that can be provided to AEMO to align the Asset Device Identifier used to support the Network Operator's business processes (e.g., the Asset Device Identifier that is provided to an electricity retailer to identify the DER Device). **Note** – A value of Null is to be provided if not utilising this optional field. Alternatively the data field can be not submitted as part of the API request.	1020 – Length must not exceed 50.		
DER Device Type	type	Text – string(50)	All – Mandatory Field	Solar PV , Storage, Controlled load, Co Tri-generation, Liquid fuel Hydro, Wind, Waste to energy, **Note** – Permitted Values are case sensitive and enumerated requiring the permitted values to be provided exactly as above.	Used to indicate the primary technology used in the DER Device. The relevant DER Device Type must be provided as per the permitted values. **Note** – The Device Type provided should be relevant to the associated DER Equipment Type provided at the AC Connection data level: Where the DER Equipment Type = • Battery Storage Inverter provide the Device Type as Storage. • Controllable Load, provide the Device Type as Controlled Load. • Hybrid Inverter, provide the Device Type as either Solar PV (for the Solar PV panels), or Controlled load.	1020 – Length must not exceed 50.	1021 – Must have a value (and not Null).	2023 – Review Data: Device type must have a value of: Solar PV, Storage, Controlled load, Co Tri-generation, Liquid fuel, Hydro, Wind, Waste to energy ***Note** – The above error will display when submitting to create a new DER Device where the value provided does not align to the permitted values. 2023 – Review Data: Device type must have a value of: Solar PV, Storage, Controlled load,

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
					• EVSE V2G, provide the Device Type as either Storage or Controlled load. • EVSE no V2G, provide the device type as Storage or Controlled load. If the device information is not known provide the device type as Controlled load. • Solar PV Inverter, provide the Device Type as Solar PV (for the Solar PV panels). • Rotating Machine, provide the device type as Waste to energy, Hydro (referred to as Small hydro in the Procedure), Wind (referred to as Small wind in the Procedure) Co Tri-generation or Liquid fuel. **Note** – New DER Device records are to be submitted from 2 October 2023 in accordance with the permitted DER Device Types as specified in the permitted values column. **Note –** The DER Equipment Types 'Other' and 'Inverter' is retained only for DER records created prior to 2 October 2023. **Note** – For DER Device records with DER Equipment Types of Other and Inverter created prior to 2 October 2023 with DER Device Types of Fossil, Other, and Unknown_Device (which are not permitted Device Types post 2 October 2023), these will be retained for historical purposes.			Co Tri-generation, Liquid fuel, Hydro, Wind, Waste to Energy, Unknown_Device, Fossil, Other. **Not**e – The above error will display when submitting an update to an existing DER Device record where the value provided does not align to the permitted values. 2023 - Invalid submission Device Type invalid for AC Connection.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
					When submitting an update (PUT) to an existing record, the device type can be retained or can be updated to the DER Device types permitted post 2 October 2023, Solar PV, Storage, Controlled load, Co Tri-generation, Liquid fuel Hydro, Wind or Waste to energy.			
Comments	comments	Text – string(100)	All – Optional Field	Free Text	The Comments field can be used to provide details of other types of DER Devices which are not described in the listing of DER Device Types above or can be used to provide additional comments related to the Device level information. **Note** – A value of Null is to be provided if not utilising this optional field. Alternatively the data field can be not submitted as part of the API request.	1020 – Length must not exceed 100.		
Number of DER Devices	count	number(5)	All DER Device Types	1 < value < = 99,999	The number of DER Devices with identical attributes provided as Level 3 information. **Note** – Where the DER Equipment Type = EVSE no V2G or EVSE V2G and the DER Device information (Electric Vehicle/battery) is not known the Number of DER Devices is to be provided as 1.	1020 – Must be between: 1 and 99,999.	1110 – Invalid submission Number of AC Connections must match. 1111 – Invalid submission Number of Devices and AC Connections must match.	2023 – Review Data: If device status = Active then must have a value (and not null).
DER Device Status	status	Text – String (14)	All DER Device Types	Active, Decommissioned	Code used to indicate the status of the DER Device. • Active means a DER Device that is physically installed and operating.	1020 – Must be one of: Active, Decommissioned.	1063 – Device status not aligned to linked AC Connection.	

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
					• Decommissioned means a DER Device that is no longer actively operating. To maintain data integrity, when a DER Device is Decommissioned the Network Operator must submit a change to update the DER Device Status to Decommissioned. The Device Status must be updated to Decommissioned if the DER Equipment linked to the DER Device is Decommissioned and if the NMI Status has also changed from Active to Extinct. **Note** – Where the DER Equipment Type = EVSE no V2G and the DER Device information (i.e. Electric Vehicle/battery) is not known the Device Status information is to be provided as 'Active'. The same rules as above apply, where the DER Equipment Type becomes 'Decommissioned' or where the NMI Status becomes Extinct, the DER Device Status is to be updated to Decommissioned.			
Manufacturer	manufacturerName	Text – string(120)	All DER Device Types	Free Text	The name of the DER Device manufacturer. May be aligned to available product databases or entered as free text. **Note** – Where the DER Equipment Type = EVSE no V2G and the DER Device information is not known (i.e.. Electric	1020 – Length must not exceed 120.		2023 – Review Data: if status = Active then must have a value (and not null).

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
					Vehicle/battery) the Manufacturer information is to be provided as 'Unknown'.			
Model Number	modelNumber	Text – string(120)	All DER Device Types	Free Text	The model number of the DER Device. May be aligned to available product databases or entered as free text. **Note** – Where the DER Equipment Type = EVSE no V2G and the DER Device information (i.e.. Electric Vehicle/battery) is not known the Model Number information is to be provided as 'Unknown'.			

For the following nominal rated capacities at the DER Device level, the following applies:

- Where the DER Device Type does not match the DER Device Type in the 'Applies to Category' column, a value of 0 is to be provided (do not use Null).
- Where the DER Equipment Type = EVSE no V2G or EVSE V2G and the DER Device Information (i.e. Electric Vehicle/battery) is not known, the capacity values may be provided as a value of 0 (do not use Null).

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
Nominal Rated Generation Capacity	nominalRatedCapacity	Numeric - number(8,3)	To be provided where the DER Device Type = • Solar PV Or • Storage Or • Co Tri-generation Or • Liquid fuel Or • Hydro Or • Wind	0 ≤ value ≤ 10000	The maximum generation capacity in kVA that is listed in the product specification by the manufacturer. This refers to the generation or injection capacity of each generation unit or battery within the DER Device group, with the total DER Device capacity derived by multiplying this figure by the number of DER Devices. **Note** – A value of 0 is to be provided where the DER Device Type does not align to the DER	1020 – Incorrect format, must be numeric (8,3).		2023 – Review Data: Data not provided (must have a value). 2024 – Review Data: Must be between: 0 and 1,000.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
			Or • Waste to energy.		Device Types outlined in the 'applies to category' column, for DER Device Type of Controlled load.			
Nominal Rated Load Capacity	nominalLoadCapacity	Numeric Number(8,3)	To be provided where the DER Device Type = • Storage Or • Controlled load.	0 ≤ value ≤ 1000	The maximum load capacity in kW that is listed in the product specification by the manufacturer. This refers to the load or withdrawal of each load within the DER Device group. This value refers to the load capacity of a single DER Device, with the total DER Device capacity derived by multiplying this figure by the number of DER Devices. **Note** – A value of 0 is to be provided where the DER Device Type does not align to the DER Device Types outlined in the 'applies to category' column, for DER Equipment Types of Solar PV (for the Solar PV panels), Co Tri-generation, Liquid fuel, Hydro, Wind, Waste to energy.	1020 – Incorrect format, must be numeric (8,3). .		2023 – Review Data: Data not provided (must have a value). 2024 – Review Data: Must be between: 0 and 1,000.
Nominal Storage Rated Capacity	nominalStorageCapacity	number(8,3)	To be provided where the DER Device Type = Storage.	0 ≤ value ≤ 1000	The Maximum storage capacity in kWh that is listed in the product specification by the manufacturer. This refers to the capacity of each storage module within the device group. **Note** – A value of 0 is to be provided where the DER Device Type does not align to the DER DeviceType outlined in the 'applies to category' column, for DER Equipment Types of Solar	1020 – Incorrect format, must be numeric (8,3).		2023 – Review Data: Data not provided. 2024 – Review Data: Must be between: 0 and 10,000.

Data Category Name in WEM DER Procedure	API Field Name	Field Type & Length	Applies to Category	Permitted Values	Description & Comments	JSON Schema Validation Error Codes.	First Level Validation Error Codes	Second Level Validation Exception Codes –Conditional Installation Stage
					PV (for the Solar PV panels), Controlled load, Co Tri-generation, Liquid fuel, Hydro, Wind, Waste to Energy.			

Appendix B. Scenario Examples

## NMI DER Installation API submission payload examples

This Appendix expands on the API submission data tables included in Appendix A. The table below provides examples of different DER Equipment Types and DER Device Types and the data to be provided to illustrate how the DER Register database manages these user cases.

The following is to be noted:

- The examples provided are not an exhaustive list of all possible combinations and permutations of DER Equipment and DER Device Types.

- The examples indicate how the data model should be read in conjunction with the requirements outlined in the WEM Procedure: Distributed Energy Resource (DER) Register Information.

- Data fields have been populated and assumed to illustrate scenario combinations and are provided for guidance only.

- Examples assume commissioned date is on or after 2 October 2023.

Example descriptions are as follows:

- **Example 1**: A single DER installation/Connection ID for DER Equipment Type – 5 kVA Solar PV Inverter with one DER Device Type – Solar PV (for the Solar PV panels).

- **Example 2:** A single DER installation/Connection ID for one DER Equipment Type – 10 kVA Solar PV Inverter + Export Limit with one DER Device Type – Solar PV (for the Solar PV panels).

- **Example 3:** Two DER installations/Connection IDs for each DER Equipment Type of Solar PV Inverter and Battery Storage Inverter (12 kVA combined) + Export Limit with two different DER Device Types of Solar PV (for the Solar PV panels) and Storage.
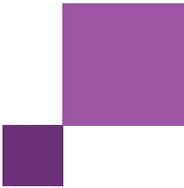
- **Example 4:** A single DER installation/Connection ID for one DER Equipment Type – Hybrid Inverter 5 kVA with two different DER Device Types of Solar PV (for the Solar PV panels) and Storage.

- **Example 5:** A single DER installation/Connection ID for one DER Equipment Type – EVSE no V2G 7 kVA with one DER Device Type - Controlled load.

- **Example 6:** Two DER Installations/Connection IDs for each DER Equipment Type of EVSE V2G 7 kVA and EVSE V2G 14 kVA with two different DER Device Types – Controlled load & Storage.

- **Example 7:** A single DER installation/Connection ID for one DER Equipment Type – Rotating Machine 1500 kVA with one DER Device Type – Waste to energy.

Table 18   Scenario Examples for fields in API NMI and DER Installation Submission Payload

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
API fields for NMI Submission Payloads									
NMI	nmi	NMI between permitted value range.							
NMI TNI	tni	TNI (4 digit code).							
NMI Status	status	Active							Active when the NMI is energised. Update to Extinct if the Connection Point has been permanently removed. If changed to Extinct, all DER Equipment and DER Devices must be changed to "Decommissioned". For details, see **Appendix A- API fields for DER Installation Submission Payloads.** **Note:** Examples provided assume NMI is energised.
NMI Zone Substation	substation	Name ID of the Zone Substation.							

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
NMI Postcode	postCode	Postcode within permitted value range.							
API fields for DER Installation Submission Payloads									
Data Model Level 1 – DER Installation									
NMI	nmi	NMI between the permitted value range.							
Connection Agreement Job Number	jobNumber	Job Number							If a Connection Agreement was not required for the addition of new DER Equipment at the installation, provide the NMI.
Approved DER Generation Capacity	approvedCapacity	5 *For the Solar PV inverter.	10 *For the Solar PV inverter.	12 *For the Solar PV Inverter.	5 * For the Hybrid Inverter.	0 * Not applicable for the EVSE no V2G.	14 * The approved Generation (For the EVSE V2G only, not applicable for the EVSE no V2G).	1500 *For the Rotating Machine.	Provided in kVA. For details see **Appendix A: WEM DER Installation API submission data fields**. Where DER Generation Capacity is not applicable a value of 0 is to be provided. **Note:** Data examples provided are based on assumed capacity.
DER Load Capacity	loadCapacity	0 * There is no applicable DER Load Capacity.	0 * There is no applicable DER Load Capacity.	6 *The applicable DER Load Capacity in kVA for the Storage.	5 * The applicable DER Load Capacity in kVA for the Hybrid Inverter.	7 *The applicable DER Load Capacity in kVA (for the EVSE no V2G).	21 *The total applicable DER Load Capacity in kVA (For both EVSE V2G and no V2G).	0 * There is no applicable DER Load Capacity.	Provided in kVA. For details see **Appendix A: WEM DER Installation API submission data fields.** Where DER Load Capacity is not applicable a value of 0 is to be provided. **Note:** Data examples provided are based on assumed capacity. The total DER Load Capacity in kVA is the total load capacity at the installation (NMI). The sum of all equipment withdrawal capacities provided

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
									(which can include storage inverters, controllable loads, hybrid inverters and EVSE).
Export Limit	exportLimitkW	5 * In this example an Export Limit is applied, the Export Limit provided must be equal to or be less than the Approved DER Generation Capacity (i.e. 5).	0 * In this example there is an Export Limit applied. (i.e. limited to zero export – provide a value of 0.	0 *In this example there is an Export Limit applied. (i.e. limited to zero export – provide a value of 0.	5 *In this example where an Export Limit is applied, the Export Limit provided must be equal to or be less than the Approved DER Generation Capacity (i.e. 5).	0 *In this example where No export Limit is applied, the Approved Generation Capacity is to be provided (i.e.. provide a value of 0).	0 *In this example, it is limited to zero export (i.e.. provide a value of 0).	1500 *In this example, where No export Limit is applied, the Approved Generation Capacity is to be provided (i.e. 1500).	Provided in kW. For details see **Appendix A: WEM DER Installation API submission data fields.** Where an Export Limit is applied, the Export Limit provided must be equal to or be less than the Approved DER Generation Capacity. Where there is no Export Limit applied the Approved DER Generation Capacity is to be provided. **Note:** Data examples provided are based on assumed capacity.
Import Limit	importLimitkW	0 * There is no applicable Import Limit.	0 * There is no applicable Import Limit.	0 * There is no applicable Import Limit.	0 * There is no applicable Import Limit.	7 * In this example, No Import Limit applied, the DER Load Capacity is provided (i.e. 7)	21 *In this example - No Import Limit applied; the DER Load Capacity is provided (i.e. 21)	0 * There is no applicable Import Limit.	Provided in kW. For details see **Appendix A: WEM DER Installation API submission data fields.** Where an Import Limit is applied, the Import Limit provided must be equal to or be less than the DER Load Capacity. Where there is no Import Limit applied, the DER Load Capacity is to be provided. **Note:** Data examples provided are based on assumed capacity.
Number of Phases Available	availablePhasesCount	Either 1, 2 or 3 as available at the Connection Point							
Number of Phases with DER Installed	installedPhasesCount	1	1	3	1	3	3	3	Provided as either 1, 2 or 3. **Note:** Data examples provided are based on assumed capacity.

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
Islandable Installation	islandableInstallation	No * Example assumed as no storage.	No * Example assumed as no storage.	Yes *Example assumed as the storage is enabled for uninterruptible power supply mode.	Yes * Example assumed as the storage is enabled for uninterruptible power supply mode.	No *Example assumed as no V2G capability.	No *Example assumed as V2G capability not always available	Either Yes or No. *Example assumed as no battery or storage.	**Note**: Data examples provided, based on assumed technical capability.
Central Protection and Control	centralProtectionControl	No	No	No	No	No	No	Yes * Assumed as 1500 kVA.	Provided as either Yes or No. To be consistent with the Network Operator's technical requirements for connection as applied at the Connection Point (for example, for Small Generating Units greater than 30 kVA). **Note:** Data examples provided are based on assumed capacity.
Under-Frequency Protection (F<)	underFrequencyProtection	Null where Central Protection and Control = No. Alternatively, the data field can be not submitted as part of the API request.						"47" Hz	Where Central Protection and Control = Yes, provide at least one of the Protection and Control Modes where applied by the Network Operator within the permitted value range. For details, see **Appendix A: WEM DER Installation API submission data fields.** **Note:** Data examples provided are to illustrate an example only, in which any one of the modes could be applied.
Under-Frequency Protection Delay (F<)	underFrequencyProtectionDelay							"2" seconds	
Over-Frequency Protection (F>)	overFrequencyProtection							53 *In Hz.	
Over-Frequency Protection Delay (F>)	overFrequencyProtectionDelay							2 *In seconds	

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
Undervoltage Protection (V<)	underVoltageProtection							10,750 * in volts	
Under Voltage Protection Delay (V<)	underVoltageProtectionDelay							2 *In seconds	
Overvoltage Protection (V>)	overVoltageProtection							11,500 *In Volts	
Overvoltage Protection Delay (V>)	overVoltageProtectionDelay							1 *In seconds	
Sustained Over Voltage	sustainedOverVoltage							11,250 *In Volts	
Sustained Over Voltage Delay	sustainedOverVoltageDelay							10 *In seconds	
Rate of Change of Frequency (RoCoF)	frequencyRateOfChange							3 *In Hz/sec	
Voltage Vector Shift	voltageVectorShift							10 *In degrees	
Inter-Trip Scheme	interTripScheme							SCADA from zone substation	
Neutral Voltage displacement	neutralVoltageDisplacement							500 *In Volts	
Other	otherProtection							Null	

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
								* Or not provided in API.	
Installer Identification	installerId	The electrical contractors licence number							
Comments	Comments	Optional field, provide as free text comments							A value of Null is to be provided if not utilising this optional field. Alternatively, the data field can be not submitted as part of the API request.
Data Model Level 2 – AC Connection									
Examples 3 and 6 require two individual AC Connections with two different DER Equipment Types, each with two different DER Device Types with data fields to be provided for each DER Device Type.									
AC Connection ID	connectionId	System Generated *For the Solar PV Inverter.	System Generated * For the Solar PV Inverter.	System Generated *Individually for the Solar PV Inverter and Battery Storage Inverter.	System Generated * For the Hybrid Inverter.	System Generated *For the EVSE no V2G.	System Generated *Individually for the EVSE V2G and EVSE non V2G.	System Generated *For the Rotating Machine.	AEMO's system generates a connectionId when the connection is first created and this is provided to the Network Operator in the API response. **Note:** Subsequently, when submitting a change to update an existing AC Connection, the same connectionId provided by AEMO is to be submitted.
Network Operator Asset Identifier	nspConnectionId	The Network Operator DER asset identifier.							
Commissioning Date	commissioningDate	yyyy-mm-dd * For the Solar PV Inverter.	yyyy-mm-dd * For the Solar PV Inverter.	yyyy-mm-dd *Individually for the Solar PV Inverter and the Battery Storage Inverter.	yyyy-mm-dd *For the Hybrid Inverter.	yyyy-mm-dd *For the EVSE no V2G.	yyyy-mm-dd *Individually for the EVSE V2G and the EVSE no V2G.	yyyy-mm-dd *For the DER Rotating Machine.	To align with the commissioning date of the DER Equipment. **Note:** Examples assume commissioned date is on or after 2 October 2023.

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
DER Equipment Type	equipmentType	Solar PV Inverter.	Solar PV Inverter.	Solar PV Inverter and Battery Storage Inverter.	Hybrid Inverter.	EVSE no V2G.	EVSE V2G and EVSE no V2G.	Rotating Machine.	
DER Equipment Unit Count	count	1	1	1	1	1	1	1	The number of DER Equipment Units with identical attributes.
DER Equipment Status	status	Active							Active - When the DER Equipment is installed and operating. Update to Decommissioned when the DER Equipment is no longer operating. The DER Equipment Status is also dependent on the DER Device and NMI Status being active. For details see **Appendix A: WEM DER Installation API submission data fields.** **Note:** Examples provided assume DER Equipment is installed and operating.
Equipment Injection Capacity	equipmentInjectionCapacity	5 *For the Solar PV inverter.	10 *For the Solar PV inverter.	6 *For the Solar PV Inverter. And 6 *For the Battery Storage Inverter.	5 *For the Hybrid Inverter.	0 **For the EV2E no V2G	14 *For the EVSE V2G. And 0 * For the EVSE no V2G.	100 *For the Rotating Machine.	Provided in kVA. 0 is to be provided for DER Equipment Types - Controllable Load and EVSE no V2G where injection capacity is not applicable. To be provided within a value > than 0 for all other DER Equipment Types. For details see **Appendix A: WEM DER Installation API submission data fields.** **Note:** Data values provided to illustrate examples only.

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
Equipment Withdrawal Capacity	equipmentWithdrawalCapacity	0 *0 as the Equipment Type = Solar PV Inverter.	0 *0 as the Equipment Type = Solar PV Inverter.	6 *For the Storage Inverter And 0 *For the Type - Solar PV Inverter.	5 *For the Hybrid Inverter.	7 *For the EV2E no V2G.	7 *For the EVSE no V2G And 14 *For the EVSE V2G	0 *0 as the Equipment Type = Rotating Machine.	Provided in kW. 0 is to be provided for DER Equipment Types of Solar PV Inverter and Rotating Machine where withdrawal capacity is not applicable. To be provided with a value > than 0 for all other DER Equipment Types. For details see **Appendix A: WEM DER Installation API submission data fields.** **Note**: Data values provided to illustrate examples only.
Electric Vehicle Supply Equipment (EVSE) Ownership Status	evseOwnershipStatus	Null	Null	Null	Null	One of Private, Public or Fleet.	One of Private, Public or Fleet.	Null	Null is to be provided where the DER Equipment Type is not EVSE V2G or ESVE no V2G. Alternatively the data field can be not submitted as part of the API request.
Authorised Agent	authorisedAgent	Name of Authorised Agent *In this example, the Solar PV Inverter is required to be available to the Emergency Solar Management Scheme and has an Authorised Agent.	Null *In this example the Solar PV Inverter is export limited and does not require an Authorised Agent.	Null *In this example the Solar PV Inverter and the Battery Storage Inverter are export limited and do not require an Authorised Agent.	In this example, the Battery Storage Inverter is not eligible for Emergency Solar Management and does not have an Authorised Agent. In this example the Battery Hybrid Inverter is required to be available to the Emergency Solar	Null *In this example, the EVSE no V2G does not have an Authorised Agent.	In this example, the EVSE V2G has an Authorised Agent and the EVSE no V2G does not have an Authorised Agent (null is provided)	In this example, the Rotating Machine has an Authorised Agent.	Null is to be provided where an Authorised Agent is not enabled. Alternatively, the data field can be not submitted as part of the API request.

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
					Management Scheme and has an Authorised Agent.				
DER Management Method	managementMethod	OEM API	Null	Null	OEM API for the Hybrid Inverter and Null for the Battery Storage Inverter.	Null	OEM API for the EVSE V2G and null for the EV2G no V2G	OEM API	Null is to be provided where an Authorised Agent is not enabled as it expected a DER Management Method is only installed where an Authorised Agent is enabled. Alternatively, the data field can be not submitted as part of the API request.
The below additional forms of protection are to provide additional information for protection equipment the Network Operator may require for the AC Connection equipment, where these are not described by other Level 1 data fields.									
Rate of Change of Frequency (RoCoF)	frequencyRateOfChange	Null	Null	Null	Null	Null	Null	Null	Where these additional forms of protection schemes are not relevant the value of Null is to be provided. Alternatively, the data field can be not submitted as part of the API request.
Voltage Vector Shift	voltageVectorShift			* For each DER Equipment Type.			* For each DER Equipment Type.		Where applied, to be provided within the permitted value ranges. For details see **Appendix A: WEM DER Installation API submission data fields.**
Inter-trip Scheme	interTripScheme								
Neutral Voltage Displacement	neutralVoltageDisplacement								**Note:** Examples assume these additional forms of protection schemes are not applied.
Equipment Serial Number	serialNumbers	Serial Number *For the Solar PV Inverter.	Serial Number *For the Solar PV Inverter.	Serial Number *For each Solar PV Inverter and Battery Storage Inverter.	Serial Number *For the Hybrid Inverter.	Serial Number *For the EVSE no V2G.	Serial Number *For each EVSE no V2G and EVSE V2G.	Serial Number *For the Rotating Machine.	

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
Equipment Manufacturer	manufacturerName	Manufacturer * For the Solar PV Inverter.	Manufacturer *For the Solar PV Inverter.	Manufacturer *For each Solar PV Inverter and Battery Storage Inverter.	Manufacturer *For the Hybrid Inverter.	Manufacturer *For the EVSE no V2G.	Manufacturer *For each EVSE no V2G and EVSE V2G.no V2G. and EVSE V2G.	Manufacturer *For the Rotating Machine.	
Equipment Model Number	modelNumber	Model Number * For the Solar PV Inverter.	Model Number *For the Solar PV Inverter.	Model Number *For each Solar PV Inverter and Battery Storage Inverter.	Model Number *For the Hybrid Inverter.	Model Number *For the EVSE no V2G.	Model Number *For each EVSE no V2G and EVSE V2G.no V2G	Model Number *For the Rotating Machine.	
Equipment Series	equipmentSeries	Equipment Series *For the Solar PV Inverter.	Equipment Series *For the Solar PV Inverter.	Equipment Series *For each Solar PV Inverter and Battery Storage Inverter.	Equipment Series *For the Hybrid Inverter.	Equipment Series *For the EVSE no V2G.	Equipment Series *For each EVSE no V2G and EVSE V2G.no V2G	Equipment Series *For the Rotating Machine.	
The Standards which apply to the DER Equipment	equipmentStandard	The standards that applies to the DER Equipment Type. Examples include: • AS/NZS.4777.2:2015 Or AS/NZS.4777:2.2020 (Grid connection of energy systems via inverters, inverter requirements). • IEC 62109-1, and IEC 62019-2 (Safety of power converters for use in PV systems). • IEC 61851-25:2020 (DC EV supply equipment for charging electric vehicles). • IEC 62196-6:2020 (Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicle).							The applicable Standard(s) relevant to each DER equipment Type/s **Note:** Examples assume commissioned date is on or after 2 October 2023 so AS/NZS.4777.2:2020 applies where DER Equipment Type = Battery Storage Inverter, Hybrid Inverter, EVSE V2G Solar PV Inverter.
Region Setting	regionSetting	B	B	B *For each Solar PV Inverter and Battery	B	Null	Null *For EVSE no V2G And	Null	A value of Null is to be provided where the DER Equipment Type = Controllable Load, EVSE no V2G, Rotating Machine. Alternatively, the data

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
				Storage Inverter.			B *For EVSE V2G		field can be not submitted as part of the API request. **Note:** Examples assume commissioned date is on or after 2 October 2023 in which Region B applies for applicable DER Equipment Types.
Additional Network Operator Requirements	addtionalRequirements	None	None	None	None	A value of Null is to be provided, alternatively the data field can be not submitted as part of the API (i.e.. In examples, 4777.2:2020 not applicable – Region Setting is not relevant).			To be provided where the 'Region Setting' is provided and additional or alterations of prescribed settings in the relevant Standard have been imposed on the DER Equipment. A value of None is to be provided where not applied. **Note**: Examples assume no Additional Network Operator Requirements.

The following data field categories and sub-categories are as described in the Australian Standard AS/NZS4777.2:2015 – 'Grid Connection of Energy Systems via Inverter' must be provided where this Standard is relevant to the AC Connection equipment (for example for equipment commissioned prior to 18 December 2021).

The following applies:

- Where the Australian Standard AS/NZS4777.2.2020 applies and the Region Setting has been provided, a value of Null is to be provided. Alternatively, the data field can be not submitted as part of the API request.

- A value of Null is to be provided where not applicable (e.g. does not align to the applicable DER Equipment Type). Alternatively, the data field can be not submitted as part of the API request.

- A value of Null is to be provided for the subsequent operating modes where a Response Mode = Not Enabled (e.g. . V1 to P at V4 where the Response Mode / volt-watt response = Not Enabled. Alternatively the data field can be not submitted as part of the API request.

*Examples provided assume commissioned date is on or after 2 October 2023 in which Region Setting B applies for the applicable DER Equipment Types.

| $V_{nom-max}$ **(sustained Operation Overvoltage Limit)** | sustainOpOvervoltLimit | Null | | | | Null | | | Where applied, to be provided within the permitted values where the Region Setting is not provided and the AS/NZS4777.2:2015 is |

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
F_{stop} (over-frequency) F_{stop} (over-frequency)	stopAtOverFreq	*Alternatively, the data field can be not submitted as part of the API request. *Region Setting - B applied.				*Alternatively, the data field can be not submitted as part of the API request. *Not applicable to DER Equipment Type.			applied to the DER Equipment Type. For details see **Appendix A: WEM DER Installation API submission data fields.**
F_{stop-CH} (under frequency)	stopAtUnderFreq								
Inverter / DRED Interaction	dredInverterInteraction								
Voltage Response Mode – volt-watt response	invVoltWattRespMode	Null *Alternatively, the data field can be not submitted as part of the API request. *Region Setting - B applied.				Null *Alternatively, the data field can be not submitted as part of the API request. *Not applicable to DER Equipment Type.			Where applied, to be provided within the permitted values where the Region Setting is not provided and the AS/NZS4777.2:2015 is applied to the DER Equipment Type. For details see **Appendix A: WEM DER Installation API submission data fields.**
V1	invWattRespV1								To be provided within the permitted values where the Region Setting is not provided and the AS/NZS4777.2:2015 is applied to the DER Equipment Type. For details see **Appendix A: WEM DER Installation API submission data fields.**
V2	invWattRespV2								
V3	invWattRespV3								
V4	invWattRespV4								
P at V1	invWattRespPAtV1								
P at V2	invWattRespPAtV2								
P at V3	invWattRespPAtV3								
P at V4	invWattRespPAtV4								

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
Voltage Response Mode– volt-var response	invVoltVarResp Mode	Null *Alternatively, the data field can be not submitted as part of the API request. *Region Setting - B applied.				Null *Alternatively, the data field can be not submitted as part of the API request. *Not applicable to DER Equipment Type.			Where applied, to be provided within the permitted values where the Region Setting is not provided and the AS/NZS4777.2:2015 is applied to the DER Equipment Type. For details see **Appendix A: WEM DER Installation API submission data fields.**
V1	invVarRespV1								Where applied, to be provided within the permitted values where the Region Setting is not provided and the AS/NZS4777.2:2015 is applied to the DER Equipment Type. For details see **Appendix A: WEM DER Installation API submission data fields.**
V2	invVarRespV2								
V3	invVarRespV3								
V4	invVarRespV4								
Q at V1	invVarRespQAt V1								
Q at V2	invVarRespQAt V2								
Q at V3	invVarRespQAt V3								
Q at V4	invVarRespQAt V4								
Reactive Power Mode	invReactivePow erMode	Null *Alternatively, the data field can be not submitted as part of the API request. *Region Setting - B applied.				Null *Alternatively, the data field can be not submitted as part of the API request. *Not applicable to DER Equipment Type.			Where applied, to be provided within the permitted values where the Region Setting is not provided and the AS/NZS4777.2:2015 is applied to the DER Equipment Type. For details see **Appendix A: WEM DER Installation API submission data fields.**
Fixed Reactive Power	invFixReactiveP ower								
Fixed Power Factor Mode	fixPowerFactorM ode								

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
Fixed Power Factor	fixPowerFactor								
Fixed Power Factor Quadrant	fixPowerFactorQuad								
Power Factor Curve / Power Response Mode	powerRespMode								
P1	referencePointP1	Null				Null			Where applied, to be provided within the permitted values where the Region Setting is not provided and the AS/NZS4777.2:2015 is applied to the DER Equipment Type. For details see **Appendix A: WEM DER Installation API submission data fields.**.
P2	referencePointP2	*Alternatively, the data field can be not submitted as part of the API request.				*Alternatively, the data field can be not submitted as part of the API request.			
Power Factor at P1	powerFactorAtP1	*Region Setting - B applied.				*Not applicable to DER Equipment Type.			
Power Factor Quadrant at P1	powerFactorQuadAtP1								
Power Factor at P2	powerFactorAtP2								
Power Factor Quadrant at P2	powerFactorQuadAtP2								
Power Rate Limit Mode / Changes in AC Operation and Control	powerRateLimitMode								
Power Ramp Rate	powerRampRate								
The following data field categories and sub-categories must be provided where relevant for rotating machines. The following applies:									

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
• A value of Null is to be provided where the DER Equipment Type does not = Rotating Machine. Alternatively, the data field can be not submitted as part of the API request. • A value of Null is to be provided where the criteria is not applicable, for example: where a data field = Not Enabled and is only required to be provided where it meets the condition of being Enabled. A Null value is to be provided, alternatively, the data field can be not submitted as part of the API request. * Data values provided are to illustrate as examples only.									
Rotating Machine Reactive Power Regulation	reactivePowerRegulation	Null *Alternatively, the data field can be not submitted as part of the API request.						Fixed Power Factor	To be provided as either None, Voltage or Fixed Power Factor. **Note**: In this example, Fixed Power Factor has been provided.
Voltage Set Point	voltageSetPoint							Null *Alternatively, the data field can be not submitted as part of the API request. *Not applicable in this example as = Voltage Droop.	Where applied, to be provided within the permitted value range where the Machine Voltage / Reactive Power Regulation = Voltage Droop. For details see **Appendix A: WEM DER Installation API submission data fields.**
Voltage Set Point Unit	voltageSetPointUnit								
Dead-band	deadband								
Droop	droop								
Base for droop	baseForDroop								
Reactive Power Source Limit	reactivePowerSourceLimit								
Reactive Power Sink Limit	reactivePowerSinkLimit								
Fixed Power Factor	reactiveFixPowerFactor							0.95	Where applied, to be provided within the permitted value range where the Machine Voltage / Reactive Power Regulation = Fixed Power Factor. For details see **Appendix A: WEM DER Installation API submission data fields.**
Fixed Power Factor Quadrant	reactiveFixPowerFactorQuad							Sink	

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
Rotating Machine Ramp Rate	generatorRampRate							Enabled	To be provided as either Enabled or Not Enabled as DER Equipment Type – Rotating Machine.
Power Ramp Gradient	powerRampGradient							10 *Provided in %/Minute	To be provided within the permitted value range where the Rotating Machine Ramp Rate = Enabled. For details see **Appendix A: WEM DER Installation API submission data fields.**.
Rotating Machine Frequency Response Mode	frequencySensitiveMode							Not Enabled	To be provided as either Enabled or Not Enabled as DER Equipment Type – Rotating Machine.
Frequency Dead-band	frequencyDeadband							Null *Alternatively, the data field can be not submitted as part of the API request.	Where applied, to be provided within the permitted value the Rotating Machine Frequency Response Mode = Enabled. For details see **Appendix A: WEM DER Installation API submission data fields.**
Frequency Droop	frequencyDroop							Null * Alternatively, the data field can be not submitted as part of the API request.	

Data Model Level 3 – DER Device

Examples 3 and 6 require two individual AC Connections with two different DER Equipment Types, each with two different DER Device Types with data fields to be provided for each Device Type.

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
AEMO Device Identifier	deviceId	Null	Null	Null	Null	Null	Null	Null	When creating an initial DER Device record populate with Null. AEMO's system auto generates a deviceid and this is provided to the Network Operator in the API response. Subsequently, when submitting a change to update an existing deviceid, the same deviceid provided by AEMO is to be submitted. **Note:** Examples provided assume creation of DER Devices.
Network Operator Asset Device Identifier	nspDeviceId	Optional field, provide as free text the unique DER Asset Device Identifier that is used by the Network Operator comments or provide as Null where not utilising this field. Alternatively, the data field can be not submitted as part of the API request.							
DER Device Type	devicetype	Solar PV *Where the DER Equipment Type = Solar PV Inverter, provide the Device Type as Solar PV (for the solar pv panels).	Solar PV *Where the DER Equipment Type = Solar PV Inverter, provide the Device Type as Solar PV (for the solar pv panels).	Solar PV and Storage * Where the DER Equipment Type = Battery Storage Inverter provide the Device Type as Storage. *Where the DER Equipment Type = Solar PV Inverter, provide the Device Type as Solar PV (for the solar pv panels).	Solar PV and Storage. *Where the DER Equipment Type = Hybrid Inverter provide the Device Type/s as either Solar PV, Storage or Controlled load (i.e.in this scenario provide one as Solar PV for the solar pv panels and one as Storage).	Controlled load *Where the DER Equipment Type = EVSE no V2G, provide the Device Type as Controlled load or Storage (Controlled load where the DER device information is not known).	Controlled load & Storage *Where the DER Equipment Types = EVS no V2G provide the Device Type as either Storage or Controlled load. Where the DER Equipment Type = EVSE no V2G provide the Device Type as Storage or Controlled	Waste toenergy *Where the DER Equipment Type = Rotating Machine the Device Type can be Waste to energy, Hydro, Co-Trigeneration or Liquid fuel.	Device Types are dependent on the DER Equipment Type. For details see **Appendix A: WEM DER Installation API submission data fields.**

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
							load (Controlled load where the DER device information is not known).		
Comments	comments	Optional field, provide as free text comments or provide as Null where not utilising this field. Alternatively, the data field can be not submitted as part of the API.							
Number of DER Devices	count	20 *For the Solar PV panels.	48 *For the Solar PV panels.	30 *For the Solar PV panels And 1 *For the Storage unit.	34 *For the Solar PV panels And 4 *For the Storage unit.	1	1 *For the single EV And 1 *For the Storage unit.	1	Provide the number of DER Devices with the identical attributes for the DER Device Type. **Note**: Data values provided are to illustrate examples.
DER Device Status	status	Active							Active - When the DER Device is installed and operating . Update to Decommissioned when the DER Device that is no longer operating. Device Status is dependent on the DER Equipment and the NMI Status being active . For details see **Appendix A: WEM DER Installation API submission data fields.** **Note**: Examples provided assume DER Device is installed and operating.
Manufacturer	manufacturerName	Provide the Manufacturer *For DER Device Type	Provide the Manufacturer *For DER Device Type –	Provide the Manufacturer	Provide the Manufacturer	Provide the Manufacturer	Provide the Manufacturer	Provide the Manufacturer	

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
		– Solar PV (for the solar pv panels)	Solar PV.(for the solar pv panels)	*For the DER Device Type - Solar PV (for the solar pv panels)and the Storage device (for the Storage Device - where the information matches the DER Equipment manufacturer information provide the same manufacture information).	*For the Der Device Type - Solar PV (for the solar pv panels) and the Storage device (for the Storage Device - where the information matches the DER Equipment manufacturer information provide the same manufacture information).	* Where the DER Device information is not known for the EVSE no V2G (i.e. Electric Vehicle/battery provide as 'unknown'.	*For the Controlled Load and/or Storage. * Where the DER Device information is not known for the ESVE no V2G (i.e. Electric Vehicle/battery provide as 'unknown'.	*Provide the DER Device Type – Waste To Energy (where the information matches the DER Equipment manufacturer provide the same information).	
Model Number	modelNumber	Provide the Model Number *For DER Device Type – Solar PV (for the solar pv panels).	Provide the Model Number *For DER Device Type – Solar PV (for the solar pv panels).	Provide the Model Number *For the Der Device Type - Solar PV (for the solar pv panels) and the Storage device (for the Storage Device - where the information matches the DER Equipment manufacturer information provide the same manufacture information).	Provide the Model Number *For the Der Device Type - Solar PV (for the solar pv panels) and the Storage device (for the Storage Device - where the information matches the DER Equipment manufacturer information provide the same manufacture information).	Provide the Model Number * Where the DER Device information is not known for the EVSE no V2G (i.e. Electric Vehicle/battery provide as 'unknown'.	Provide the Model Number *For the Controlled Load and/or Storage. * Where the DER Device information is not known for the ESVE no V2G (i.e. Electric Vehicle/battery provide as 'unknown'.	Provide the Model Number *Provide the DER Device Type – Waste To Energy (where the information matches the DER Equipment manufacturer provide the same information).	

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
Nominal Rated Generation Capacity	nominalRatedCapacity	0.3 * For DER Device Type – Solar PV (for the solar pv panels).	0.25 * For DER Device Type – Solar PV (for the solar pv panels).	0.25 *For DER Device Type – Solar PV (for the solar pv panels). And 6 *For the Storage DER Device Type.	.175 *For DER Device Type – Solar PV (for the solar pv panels). And 1.25 *For the Storage DER Device Type.	0 *For the DER Device Type = Controlled load for the EVSE no V2G.	0 *For the DER Device Type = Controlled load for the EVSE no V2G. And 14 *For the single Storage unit. *A value of 0 may be provided where the DER Device Type = Storage for EVSE no V2G and/or EVSE V2G (0 where the generation capacity is unknown).	1500 *For DER Device Type – Waste to energy.	The maximum generation capacity in kVA that is listed in the product specification by the manufacturer. To be provided where the DER Device Type = Solar PV Panels, Storage, Co Tri-generation, Liquid fuel, Hydro, Wind or Waste to energy. Where the DER Device Type = Controlled Load, a value of 0 is to be provided (do not use Null).
Nominal Rated Load Capacity	nominalLoadCapacity	0 *For the DER Device Type = Solar PV (for the solar pv panels).	0 *For DER Device Type = Solar PV (for the solar pv panels).	6 * For the DER Device Type – Storage (i.e. 6). And 0 *For the DER Device Type - Solar PV (for the solar pv panels).	1.2 *For the DER Device Type – Storage (i.e. 13.5). And 0 *For the DER Device Type - Solar PV (for the solar pv panels).	7 *For the DER Device Type Storage. *Alternatively, a value of 0 may be provided for the EVSE no V2G where the storage capacity is unknown.	7 *For the EVSE no V2G – Controlled load And 14 * For the EVSE V2G singe storage unit. *Alternatively a value of 0 may be provided for	0 *A value of 0 is to be provided as the DER Device Type = Waste to energy.	The maximum load capacity in kW that is listed in the product specification by the manufacturer. Where the DER Device Type does = Controlled load or Storage, a value of 0 is to be provided. (do not use Null). Where the DER Equipment Type = EVSE no V2G and or EVSE V2G and the DER Device Information (i.e. Electric Vehicle/Battery) is not known, the storage capacity may be provided as a value of 0 (do not use Null).

Category	API Field Name	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Notes
							EVSE no V2G and/or EVSE V2G where the load capacity is unknown.		
Nominal Storage Rated Capacity	nominalStorage Capacity	0 *For the DER Device Type = Solar PV(for the solar pv panels).	0 *For the DER Device Type = Solar PV (for the solar pv panels).	13 *For the DER Device Type = Storage (i.e. 13). And A value of 0 is to be provided for the DER Device Type = Solar PV (for the solar pv panels).	4 *For the DER Device Type = Storage (i.e. 4). And A value of 0 is to be provided for the DER Device Type = Solar PV (for the solar pv panels).	0 *A value of 0 may be provided as the DER Device Type = Controlled load for the EVSE no V2G (0 where the storage capacity is unknown.	200 *Given as an example for the single storage unit for EVSE V2G And 0 for the EVSE no V2G Controlled load. *A value of 0 may be provided as the DER Device Type = Controlled load or Storage for the EVSE no V2G or EVSE V2G (0 where the storage capacity is unknown).	0 *For the DER Device Type = Waste to energy.	The Maximum storage capacity in kWh that is listed in the product specification by the manufacturer where the DER Device Type = Storage. Where the DER Device Type does not = Storage, a value of 0 is to be provided (do not use Null). Where the DER Equipment Type = EVSE no V2G and the DER Device Information (i.e. Electric Vehicle/Battery) is not known, the storage capacity may be provided as a value of 0 (do not use Null).

Appendix C.   Validation Errors and Exceptions

This appendix is to outline in accordance with paragraph 4 of the WEM Procedure: Distributed Energy Resource (DER) Register information regarding the relevant exception notifications.

JSON schema validation errors

As described in section 5 **Validation Levels**, JSON schema validation errors occur if JSON fails certain validation. A NMI record and DER Installation record is not created in the DER Register if it does not pass the JSON schema validations and is not classified to have met the criteria to be in a 'Confirmed' state.

Table 19 outlines error codes which may be returned in the API response, the validation description and actions to rectify the error.

Table 19   JSON schema validation errors

Error Code	Error Messages	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
1020	- Does not meet maximum length of (maximum length). - Does not meet minimum length of (minimum length). - Length must be (required length). - Length must be between (from length) and (to length). - Length must not exceed (max length). - Must be a valid date with the format (date format).	Where data is not provided, is missing or provided in the incorrect format, details of the field/s will be returned as part of the API Response error message as part of the title and or detail.	For further information on data fields which may return JSON error code 1020 see **Appendix A: WEM NMI API submission data fields** and **Appendix A: WEM DER Installation API submission data fields**, column 'JSON Schema Validation Error Code'.	Validate the missing and or incorrect data 'attributes' included in the exception message and re-submit with valid attributes fields.

Error Code	Error Messages	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
	• Must be one of (allowed values). • Incorrect format must be numeric. • Requires property 'field name'. • Must be an array of object, with 0 to (max array length) values. • Must be an array of strings, with 0 (to formatted decimal string) values. • Must be between (from value) to (to value). • Must have a value (and not null). • request.body 'fieldname' is not of a type(s) string (i.e. null value has been provided). • 1020 – request.body 'is not one of enum values' (i.e. null value has been provided instead of Active Extinct).			
400	Examples: • Incorrect format must be <type>.	Where data is provided but is of the wrong type for the field. For example, a string is provided when a number is required.	All fields	Validate the incorrect data for the JSON field specified in the error detail and re-submit with valid fields and values.

First level validation errors

As described in Section 5 **Validation Levels**, first level validation errors occur when errors are found in the created or updated NMI record and or DER Installation record according to the validation applied to a specific data field. The error code, message detail and field 'attributes' are included in the API response.

A DER record is not created in the DER Register if it does not pass first level validation and is not classified to have met the criteria to be in a Confirmed state.

Table 20 outlines the first level validation error code and error message detail returned in the API response, the validation applied and actions to rectify the error.

For further information on data fields which may return first level validation errors see **Appendix A: WEM NMI API submission data fields** and **WEM DER Installation API submission data fields**, column 'First Level Validation Error Code'.

Table 20   First Level Validation Errors

Error Code	Error Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
1000	Job number already in use.	The Job number submitted in the API - DER Installation submission payload must be unique for an NMI and must not have been submitted before for a different NMI when submitting a DER Installation API submission payload (Create and Update).	jobNumber	Validate the job number applicable to the NMI and re-submit with the assigned unique job number.
1010	Invalid Submission: Value must be between 8001000000 to 8020999999 or WAAA000000 to WAAAZZZZZZ excluding WAAAW.	The NMI must be within the permitted value range.	nmi	Validate the NMI number submitted and re-submit the assigned NMI within the permitted value range.
1010	NMI does not exist in DER Register Database.	The NMI must exist in the DER Register database when submitting a **Create DER Installation record** (POST) and when	nmi	• Validate the NMI number submitted aligns to the NMI assigned, where it does not align re-submit with the assigned NMI.

Error Code	Error Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify

		submitting an **Update DER Installation** record (PUT) API submission.		• If the NMI number submitted aligns to the assigned NMI, verify if a **Create NMI record** API submission has been submitted previously.
				
				  o If a **Create NMI record** API submission was not submitted, a Create NMI record will need to be submitted.
				
				  o If a **Create NMI record** API submission was submitted previously but it did not pass validation, resulting in an error code/s being returned, the exception/s are to be resolved and resubmitted with the valid attributes required.

1013	Installation has already been created.	This error will occur if attempting to create a DER Installation API if a **Create DER Installation record** API has already been created for the associated NMI.	nmi	• Validate the NMI number submitted aligns to the NMI assigned, where it does not align re-submit with the assigned NMI. • Where the DER Installation has already been created successfully in the DER Register a **Create DER Installation record** submission is not required as it already exists. If a change is required to the already existing installation, submit an **Update DER Installation** record API instead of a **Create DER Installation record** API submission.
1014	Invalid postcode: Not located in Western Australia.	The postcode where the NMI is installed must be within the range of 6000 to 6999 when submitting a WEM NMI API submission payload (Create and Update).	postcode	Validate the postcode where the NMI is located and re-submit with updated postcode.
1015	Installation has not been created for the NMI	This error will occur if attempting to update a DER Installation (using **Update DER Installation** API) for a NMI which has no records of a installation being created	nmi	• Validate the NMI submitted aligns to the NMI assigned, where it does not align re-submit with the assigned NMI.

Error Code	Error Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify

		previously for the associated NMI in the DER Register database.		• If the NMI submitted aligns to the assigned NMI, verify if a **Create DER Installation record** has been submitted previously.
				
				  o If a **Create DER Installation record** API (POST API call method) submission has not been submitted previously for the assigned NMI, a **Create DER Installation record** will need to be submitted.
				
				  o If a **Create DER Installation record** was submitted previously but it did not pass validation, resulting in an error code/s being returned, the exception/s are to be resolved and resubmitted with the valid attributes required.

1020	'field name' cannot contain control characters.	The field name referred to in the details of the error message has been provided with control characters which is not supported, i.e. ([\r\n\"\t\f\]+)');)).	For further information on data fields which may return error 'cannot contain control characters' see **Appendix A: WEM NMI API submission data fields** and **Appendix A: WEM DER Installation API submission data fields**, column 'First Level Validation Error Codes' (i.e. substation, tni).	Validate the data attribute included in the exception message and re-submit with valid attributes which do not contain control characters.
1020	Requires property 'field name'.	The field name referred to in the details of the error message has been provided as spaces within the allowable field length (i.e. the field length is 4 and 4 spaces have been provided).	For further information on data fields which may return error 'cannot contain control characters' see **Appendix A: WEM NMI API submission data fields** and **Appendix A: WEM DER Installation API submission data fields**, column 'First Level Validation Error	Validate the data attribute included in the exception message and re-submit with valid attributes.

Error Code	Error Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
			Codes' (i.e. nmi, substation, tni, status, postcode).	
1020	Invalid submission: Mismatch between path parameter NMI and request payload NMI.	The NMI provided in the path parameter and the NMI in the request payload section of the API does not match.	nmi	Validate the NMI included in the path parameter and request payload section of the API and resubmit with the NMI to align.
1020	Content must be in the correct format (One of the Equipment Types as per Permitted Values).	The DER Equipment Type must be one of: Storage Inverter, Controllable Load, Hybrid Inverter, EVSE V2G, EVSE no V2G, Rotating Machine, Solar PV Inverter, **Note –** The DER Equipment Type 'Inverter' and 'Other' is retained for DER records created prior to 2 October 2023 (for the PUT API call method only). For DER Equipment commissioned on or after 2 October 2023 Equipment Types of 'Inverter' or 'Other' will not be valid. **Note** – Permitted Values are case sensitive and enumerated requiring the permitted values to be provided exactly as above.	equipmentType	Validate the data 'attributes' included in the exception message and re-submit with valid attributes.
1020	Invalid Submission: NMI already exists.	If an NMI has already been created in the DER Register data base and an additional **Create NMI record** API request is submitted to create another record for the same NMI an exception will occur.	nmi	Validate the NMI number applicable to the Connection Point where the DER has been installed. • If the NMI submitted does not align to the assigned NMI, re-submit with the assigned NMI.

Error Code	Error Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
				• If the NMI submitted aligns to the NMI assigned, conduct a search using the retrieve NMI details to locate and view the NMI in the DER Register database. If changes are required to be updated a change is to be submitted using the existing DER Register database information (Connection Id, Device Id). To update a DER Installation record already stored in the DER Register, submit an update using the **Update DER Installation** API payload.
1021	Must have a value (and not null).	All mandatory fields are to be provided. Where a mandatory field is not provided, details of the field/s will be returned as part of the API Response exception message when submitting a WEM DER Installation API submission payload (Create and Update).	For further information on data fields which may return error code 1021 see **Appendix A: WEM DER Installation API submission data fields.**.	Validate the missing information 'attributes' included in the exception message and re-submit with all mandatory fields.
1030	DER installation information missing. Please link an AC Connection to this NMI.	This error will occur where submitting a WEM DER Installation API submission payload (Create and or Update) with no AC Connection provided. The NMI must have at least one AC Connection linked to it.	acConnections	Validate the AC Connection details submitted and re-submit with valid AC Connection information linking at least one AC Connection to the NMI.
1031	DER installation information missing. Please link a Device to this AC Connection.	This error will occur where submitting a WEM DER Installation API submission payload (Create and or Update) with no DER device details (i.e. blank information). Each AC Connection with a status of Active must have at least one DER Device linked to it.	count	Validate the DER Device details submitted and re-submit with valid DER Device information linking at least one device to the AC Connection.

Error Code	Error Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
1040	DER Record mismatch to AEMO data.	This error will occur where submitting a WEM DER Installation API submission payload to update an existing: • AC Connection/s which has a DER equipment status of active. • DER Device/s which has a DER Device status of active. where not all active AC Connections and or DER devices has been submitted. For example, if there are two active AC Connections associated with the NMI both AC Connections must be provided even if changes are not required to one of the AC Connections. All active AC Connections and DER devices information must be submitted, even if only making changes to one of the AC Connections or Devices.	acConnections and devices	Validate the AC Connection and or DER device and resubmit with all the associated active AC Connection and or DER devices.
1050	Invalid AC Connection identifier (connectionId must align to current connectionId).	Where submitting a **Update DER Installation** API submission payload to update an existing AC Connection, the connection id must align to the connectionId generated previously by AEMO.	connectionId	Validate the connectionId and resubmit with null where creating a DER installation submission payload or re-submit with the connectionId previously provided by AEMO where updating an existing AC Connection.
1051	Invalid submission: Invalid Device identifier. (deviceId must be null or align to current deviceId).	Where submitting a **Update DER Installation** API submission payload to update an existing DER device, the device Id must align to the device Id generated previously by AEMO.	deviceId	Validate the deviceid and resubmit with null where creating a DER device or re-submit with the deviceid previously provided by AEMO when updating an existing DER device.
1063	Device status not aligned to linked AC Connection.	Where submitting a **Update DER Installation** API submission payload to update an existing DER device, if the AC Connection linked to the DER device has a status of	status (Device Status)	Validate the device status and where the device has been decommissioned update the Device status to decommissioned.

Error Code	Error Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
		decommissioned the Device status must be also be decommissioned.		If the AC Connection status had been previously updated to decommissioned in error submit a change to update the AC Connection status to active. Once the AC Connection status is updated to active a new request to update other associated information can be re-submitted.
1070	Invalid Commissioning Date provided (cannot be in the future).	Where the commissioning date provided is in the future when submitting a WEM DER Installation API submission payload (Create and Update).	commissioningDate	Validate the commissioning date and re-submit with a valid commissioning date.
1110	Invalid submission: Number of AC Connections must match.	Each Active AC Connection must have the number of active AC Connections equal to or less than total of the number of active DER Devices that are linked to it, i.e. number of active AC Connections<= SUM {number of active Devices 1 + number of active Devices 2 … + number of active Devices n} Where n is the number of DER devices or group of DER devices connected to that AC Connection. This validation is applicable to DER equipment types of Inverter, Battery Storage Inverter, Controllable Load, Hybrid Inverter, EVSE V2G, EVSE no V2G and Solar PV Inverter when submitting a WEM DER Installation API submission payload (Create and Update) **Note –** The DER equipment type of Inverter is retained for DER records created prior to 2 October 2023.	count	Validate the count of active DER devices submitted and re-submit the count of active DER devices to be equal to or less than the number of active AC Connections.

Error Code	Error Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
1111	Invalid submission: Number of Devices and AC Connections must match.	If the AC equipment type is Other, or Rotating Machine then the number of active AC Connections must equal to the number of active DER devices linked to it when submitting a WEM DER Installation API submission payload (Create and Update) . **Note –** The DER Equipment Type – Other is retained for DER records created prior to 2 October 2023.	count	Validate the count of active DER devices submitted and re-submit the count of active DER devices to align with the number of active AC Connections.
1130	Invalid submission: Export limit exceeds approved capacity.	The export limit specified, must be equal to or smaller than the approved DER generation capacity provided when submitting a WEM DER Installation API submission payload (Create and Update) .	exportLimitkW	Validate the export limit and the approved generation capacity provided and re-submit with the export limit (must be equal or smaller than the approved generation capacity). **Note -** If the approved generation capacity submitted is not accurate, re-submit the approved generation capacity and the export limit accordingly.
1131	Invalid submission: Import limit exceeds DER Load Capacity	The import limit specified, must be equal to or smaller than the load capacity provided when submitting a WEM DER Installation API submission payload (Create and Update).	importLimitkW	Validate the import limit and the load capacity provided and re-submit with the import limit (must be equal or smaller than the load capacity). **Note -** If the load capacity submitted is not accurate, re-submit the load capacity and the export limit accordingly.
1140	Invalid submission Value is percentage, maximum is 100%.	If the voltage set point unit is provided in %, then it must not be more than 100 when submitting a WEM DER Installation API submission payload (Create and Update).	voltageSetPoint	Validate the voltage set point submitted and re-submit (must not be more than 100 if provided in %).

Second level validation exceptions

As described in Section 5 **Validation Levels**, second level validation exceptions occur when errors are found in the created or updated DER Installation submission payload record according to validations applied to a specific data field. The exception code, exception message included as 'detail' and field 'attribute' in the title are included in the API response.

The 'installation stage' displays a status of 'Conditional' and remains in a conditional status until the second level validation exception is resolved.

A DER Installation record is created in the DER Register, however records with a status of 'Conditional' are not classified to have met the criteria to be in a 'Confirmed' state as specific data provided has not passed validation.

Table 21 outlines the second level validation exception codes and error message detail returned in the API response, the validation applied and actions to rectify the exception.

For further information on data fields and second level validation exceptions, see **Appendix A: WEM DER Installation API submission data fields**, column 'Second Level Validation Exception Code – Conditional Installation Stage.'

Table 21   Second Level Validation Exception

Exception Code	Exception Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
2023	Examples include: • Missing Information (cannot contain blank serials). • Review Data: Data Not Provided (Must provide at least 1 serial number). • Review Data: Must have a value of (permitted value).	Where data is not provided, is missing or provided in the incorrect format, details of the field/s will be returned as part of the API response exception message as part of the title and or detail.	For further information on data fields which may return exception code 2023 see **Appendix A: WEM NMI API submission data fields** and **Appendix A: WEM DER Installation API submission data fields**, column 'Second Level Validation Exception Codes'.	Review the exception message returned and the field attributes included in the response and re-submit with the missing/not provided data attributes.

Exception Code	Exception Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
	• Review Data: Must have a value when (dependency field) is (dependency range parameter). • Must have a value of (dependency value) if (property name) is (conditional value). • Review Data: Must have a value if (name of Response Mode) is. • Review Data: Must have a value of Not Enabled (if name of Response mode) is Enabled. • Review Data: Must have a value of Enabled (if name of Response Mode) is Not Enabled. • Review Data: Data Not Provided (must have a value). • Review Data: Data not provided, must have a value when (dependency property name) has a value. • Review Data: Must be between: (from value) to (to value).			
2023	Review Data: Region Setting must be provided as Region B if Commissioning Date is > than or equal to 18.12.2021.	Where DER equipment type is one of: Hybrid Inverter, Battery Storage Inverter, EVSE V2G or Solar PV Inverter. The region setting is applicable where the Australian Standard AS/NZS4777.2.2020 applies when submitting a DER Installation API submission payload (Create and Update).	regionSetting	

Exception Code	Exception Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
2023	Review Data: Region Setting has been provided and Commissioning Date is < than 18.12.2021.	Where the region setting has been provided and the commissioning date is before the 18.12.2021 in which the region setting is not applicable. The region setting is not applicable where the Australian Standard AS/NZS4777.2.2020 does not apply when submitting a DER Installation API submission payload (Create and Update).	regionSetting	Validate the commissioning date and region setting provided, resubmit with valid attributes, (i.e. correct the commission date if incorrect, where correct do not provide the region setting).
2023	Review Data: Data Not Provided (Must be provided where Region Setting is not applied (where DER Equipment Type is one of: Hybrid Inverter, Battery Storage or Solar PV Inverter).	Where the region setting is not applied as it is not relevant (the commissioning date is before the 18.12.2021), the impacted fields must be provided where the DER equipment type is one of Hybrid Inverter, Battery Storage Inverter or Solar PV Inverter). Impacted fields are required where the Australian Standard AS/NZS4777.2.2015 applies when submitting a DER Installation API submission payload (Create and Update).	sustainOpOvervoltLimit stopAtOverFreq stopAtUnderFreq dredInverterInteraction invVoltWattRespMode	
2023	Review Data: (At least one Protection and Control Modes must be provided if Central Protection Control is Yes).	Where "Yes" is provided for central protection and control at least one of the protection and control modes must be provided when submitting a DER Installation API submission payload (Create and Update)**,**otherwise this will result in exception code 2023 being returned.	underFrequencyProtection underFrequencyProtectionDelay overFrequencyProtectionDelay overFreqencyProtectionDelay underVoltageProtection underVoltageProtecitonDelay overVoltageProtection overVoltageProtectionDelay	Validate the protection and control modes and re-submit with at least one of the modes within the applicable permitted value range.

Exception Code	Exception Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
			sustainedOverVoltage	
			sustainedOverVoltageDelay	
			frequencyRateOfchange	
			voltageVectorShift	
			interTripScheme	
			neutralVoltageDisplacemennt	
			otherProtection	
2023	Review Data: Must have a value of: Solar PV, Storage, Controlled load, Co Tri-generation, Liquid fuel, Hydro, Wind, Waste to energy.	When creating a new DER device and the DER device type submitted does not align to the permitted values (i.e. When creating a new DER device and the DER device type submitted does not align to the permitted values (i.e. When creating a new DER device and the DER device type submitted does not align to the permitted values (i.e. Other, Unknown or has been misspelt or case sensitive). **Note** - Permitted Values are case sensitive and enumerated requiring the permitted values to be provided as an exact match	type	Validate the DER device type and re-submit with a DER device type to align with the permitted values.
2023	Review Data: Must have a value of: Solar PV, Storage, Controlled load, Co Tri-generation, Liquid fuel, Hydro, Wind, Waste to energy, Unknown_Device, Fossil, Other.	When updating an existing DER device and the DER device type submitted does not align to the permitted values (i.e. Solar instead of Solar PV or has been misspelt or case sensitive). **Note** - Permitted values are case sensitive and enumerated requiring the permitted values to be provided as an exact match.	type	Validate the DER device type and re-submit with a DER device type to align with the permitted values.

Exception Code	Exception Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
2023	Invalid submission Device type invalid for AC Connection type.	The DER device type submitted must be applicable to the DER equipment type. Where the DER equipment type = • Battery Storage provide the DER device type as Storage. • Controlled Load provide the DER Device type as Controlled Load. • Hybrid Inverter provide the Device Type as either Solar PV, Storage or Controlled Load. • EVSE V2G or EVSE no V2G, provide the Device Type as either Storage or Controlled Load. • Solar PV Inverter, provide the Device Type as Solar PV (for the solar pv panels). • Rotating Machine, provide the device type as either Waste to Energy, Hydro, Wind, Co-Trigeneration or Liquid Fuel. **Note** – For DER Device records with DER Equipment Types of Other and Inverter created prior to 2 October 2023 with DER Device Types of Fossil, Wind, Other, Hydro and Unknown device, these will be retained for historical purposes. When submitting an update to an existing record, the device type can be retained or can be updated to the DER device types permitted post 2 October 2023.	type	Validate the DER device type and re-submit with a DER device type applicable to the DER equipment type.

Exception Code	Exception Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
		Where the equipment type = Inverter provide the device type as either Other, Solar PV, Storage, Unknown_Device, Fossil, Wind, Other, Hydro, Controlled Load, Co Tri-generation, Liquid fuel or Waste to energy. Where the Equipment Type = Other, provide the device type as either Other, Solar PV, Storage, Unknown_Device, Fossil, Wind, , Hydro, Controlled Load, Co Tri-generation, Liquid fuel or Waste to energy. **Note** – New DER device records are to be submitted from 2 October 2023 in accordance with the permitted DER device types as specified in the permitted values column. **Note** - Permitted values are case sensitive and enumerated requiring the permitted values to be provided as an exact match.		
2024	Review Data: The Equipment Injection Capacity has been provided as 0 (Where the associated DER Equipment Type is one of: Battery Storage Inverter, Hybrid Inverter EVSE V2G, Rotating Machine, Solar PV Inverter).	If the equipment injection capacity is provided as 0 kVA and the associated DER equipment type is one of Hybrid Inverter, Battery Storage Inverter, EVSE V2G, Rotating Machine, Solar PV Inverter.	equipmentInjectionCapacity	Validate the equipment injection capacity value provided and re-submit.
2024	Review Data: The Equipment Withdrawal Capacity has been provided as 0 (Where DER Equipment Type is one of Hybrid Inverter, Battery Storage Inverter, EVSE V2G, EVSE no V2G, Controllable Load).	If the equipment withdrawal capacity is provided as 0 kW and the DER equipment type is one of Hybrid Inverter, Battery Storage Inverter, EVSE V2G, Solar PV Inverter.	equipmentWithdrawalCapacity	Validate the equipment injection capacity value provided and re-submit.

Exception Code	Exception Message Detail	Validation applied	Impacted Field(s)-	Comments/Actions to rectify
2024	Review Data: Must be between (from value) to (to value).	Where the data is not provided within the permitted value range, details will be returned in the API Response exception message as part of the title and or detail.	For further information on data fields which may return exception code 2024 see **Appendix A: WEM NMI API submission data fields** and **Appendix A: WEM DER Installation API submission data fields**, column 'Second Level Validation Exception Codes'.	Validate the impacted data field and the value range provided and re-submit within the permitted value range.
2040	Review data: Installed injection capacity greater than approved capacity.	The approved capacity must be equal to or greater than the AC Connection installed injection capacity when submitting a DER Installation API submission payload (Create and Update).	approvedCapacity	Validate the approved capacity value and the injection capacity value provided and re-submit.
2040	Review data: Installed withdrawal capacity greater than Load capacity	The load capacity must be equal to or greater than the AC Connection installed withdrawal capacity when submitting a DER Installation API submission payload (Create and Update).	loadCapacity	Validate the load capacity value and the withdrawal capacity value provided and re-submit.

Glossary

This glossary lists terms, acronyms and abbreviations used in this document.

Also refer to **AEMO's API Portal glossary**.

Table 22   Terms and descriptions

Term	Description
AC	Alternating Current
AEMO	Australian Energy Market Operator
API	Application Programming Interface. A set of clearly defined methods of communication between various software components.
API Portal	Where users can view available APIs, manage API Keys, and obtain OAS files. **See documents in AEMO Dev Portal**
DER	Distributed Energy Resources
Endpoint	Where the API request is sent and where the response comes from. **Refer to Endpoints in AEMO's Dev Portal**.
Header parameters	Parameters included in the request header.
JSON	JavaScript Object Notation. A lightweight syntax containing objects and arrays, usually used (instead of XML) to return information from a REST API.
Key pair	SSL uses a technique called public-key cryptography, based on the concept of a Key Pair. The Key Pair consists of encrypted Public and Private Key data. It is only possible to decrypt the Public Key with the corresponding Private Key.
method	The allowed operation for a resource, e.g., GET, POST, PUT, DELETE, and so on. These operations determine whether you are reading information, creating new information, updating existing information, or deleting information.
mTLS	Mutual TLS (mTLS) is a type of authentication in which the two parties in a connection authenticate each other using the TLS protocol.
OAS	Open API Specification
Open API specification document	The file, either in YAML or JSON, describing your REST API. **Follows the Open API specification format.**
Parameters	Parameters are options you pass with the endpoint (such as specifying the response format, or the amount returned). There are four types of parameters: header parameters, path parameters, query string parameters, and request body parameters. The different types of parameters are often documented in separate groups on the same page. Not all endpoints contain each type of parameter. **Refer to Parameters in AEMO's Dev Portal.**
Participant API Gateway	The interface implemented by participants where AEMO pushes messages.
Participant ID	Registered participant identifier
Participant user ID	The user ID to login to the system.

Term	Description
Participant users	Set up by the company's Participant Administrator
Path parameters	Parameters in the path of the endpoint, before the query string (?). Path parameters are usually set off within curly braces.
Payload	The data sent by a POST request. The Payload section sits after the header.
PID	Participant ID
Pre-production	AEMO's test system available to the participants.
Private key	The secret Private Key is a text file used initially to generate a Certificate Signing Request (CSR), and later to secure and verify connections.
Production	AEMO's live system
Public key	The Public key is included as part of your SSL certificate, and works together with your Private Key to make sure your data is encrypted Key (i.e., the certificate) can verify the digital signature is authentic without having to know the secret Private Key.
Query string parameters	Parameters in the query string of the endpoint, after the ?.
Request	The way information is returned from an API. In a request, the client provides a resource URL with the proper authorization to an API server. The API returns a response with the information requested.
Request body parameters	Parameters in the request body. Usually submitted as JSON.
Response	The information returned by an API after a request is made. Responses are usually in JSON or XML format.
REST	The Representational State Transfer API architecture
SSL	Secure Sockets Layer, cryptographic protocol providing API communication security
Swagger	Refers to the OpenAPI specification.
Swagger file	The OpenAPI Specification (OAS) definition of the API.
TLS	Transport Layer Security, cryptographic protocol providing API communication security. See **TLS Certificate Management**
URM	User Rights Management; see the **Guide to User Rights Management** on AEMO's website
zip	The file compression format used for exchanging data with AEMO.