

Form A2-2: Compliance Verification Report for Synchronous Power Generating Modules > 50 kW and also for Synchronous Power Generating Modules ≤ 50 kW where the approach of this form is preferred to that in Form A2-1

This form should be used by the **Manufacturer** to demonstrate and declare compliance with the requirements of EREC G99. The form can be used in a variety of ways as detailed below:

1. To obtain **Fully Type Tested** status

The **Manufacturer** can use this form to obtain **Fully Type Tested** status for a **Power Generating Module** by registering this completed form with the Energy Networks Association (ENA) Type Test Verification Report Register.

2. To obtain **Type Tested** status for a product

This form can be used by the **Manufacturer** to obtain **Type Tested** status for a product which is used in a **Power Generating Module** by registering this form with the relevant parts completed with the Energy Networks Association (ENA) Type Test Verification Report Register.

3. One-off Installation

This form can be used by the **Manufacturer** or **Installer** to confirm that the **Power Generating Module** has been tested to satisfy all or part of the requirements of this EREC G99. This form must be submitted to the **DNO** as part of the application.

A combination of (2) and (3) can be used as required, together with Form A2-4 where compliance of the **Interface Protection** is to be demonstrated on site.

Note:

If the **Power Generating Module** is **Fully Type Tested** and registered with the Energy Networks Association (ENA) Type Test Verification Report Register, the Installation Document (Form A3-1 or A3-2) should include the **Manufacturer's** reference number (the Product ID), and this form does not need to be submitted.

Where the **Power Generating Module** is not registered with the ENA Type Test Verification Report Register or is not **Fully Type Tested** this form (all or in parts as applicable) needs to be completed and provided to the **DNO**, to confirm that the **Power Generating Module** has been tested to satisfy all or part of the requirements of this EREC G99.

PGM technology			
Manufacturer name			
Address			
Tel		Web site	
E:mail			
Registered Capacity, use separate sheet if more than one connection option.		kW	

If the Generator is fully type tested the applicant should apply using Form A1-1 or A1-2; depending on the generation type.

If the power generating modules are partially type tested the developer / installer will use this form to show what equipment is type tested, what equipment requires type test results to be submitted and what type tests will be undertaken & commissioned on site.

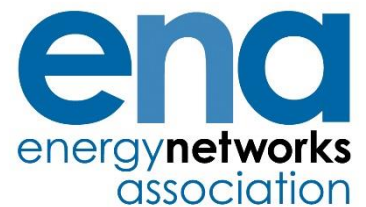
If the generator is fully type tested and a product listed on the ENA approved list please complete Form A1-1 or A1-2.

This form is used to inform SSEN what equipment within the Power Generating Module has been type tested, what equipment requires type test results to be submitted and what type tests will be undertaken & commissioned on site.

All boxes in this section must be completed.

Engineering Recommendation G99 Form A2-2

Type A Power Generating Modules



There are four options for Testing: (1) **Fully Type Tested**, (2) **Partially Type Tested**, (3) one-off installation, (4) tested on site at time of commissioning. The check box below indicates which tests in this Form have been completed for each of the options. With the exception of **Fully Type Tested PGMs** tests marked with * may be carried out at the time of commissioning (Form A4).

Sections 1-4 & 11 must be evidenced and provided to SSEN ahead of on-site works. If the manufacturer does not provide this works should not be scheduled

Sections 5-10 & 12-13 can be completed on-site. All type tests must be undertaken and must meet G99 requirements.

On-site work must be recorded within Form A2-4.

If the manufacturer has stated some partial type testing they must state the ENA ID number in this box.

Sections 1-4 & 11 must be evidenced and provided; this is captured within the table by inserting an "X" in the relevant column.

Sections 5-10 & 12-13 can be completed at the time of commissioning. If type testing is occurring on site please enter an "X" in column 4 of the associated Test Option.

On site type testing will require Form A2-4 to be completed.

For any partially type tested evidence please insert the ENA ID number in this box

Tested option:	1. Fully Type Tested	2. Partially Type Tested	3. One-Off Man. Info.	4. Tested on Site at time of Commissioning
0. Fully Type Tested - all tests detailed below completed and evidence attached to this submission		N/A	N/A	N/A
1. Operating Range	N/A			
2. PQ – Harmonics				
3. PQ – Voltage Fluctuation and Flicker				
4. Power Factor (PF)				
5 Frequency protection trip and ride through tests*				
6 Voltage protection trip and ride through tests*				
7. Protection – Loss of Mains Test, Vector Shift and RoCoF Stability Test*				
8. LFSM-O Test*				
9. Power Output with Falling Frequency Test*				
10. Protection – Reconnection Timer*				
11. Fault Level Contribution				
13. Logic Interface (input port)				

* may be carried out at the time of commissioning (Form A2-4).

Document reference for **Manufacturers' Information** including the ENA Type Test Verification Report Register Product ID number where applicable:

Engineering Recommendation G99 Form A2-2

Type A Power Generating Modules



Manufacturer compliance declaration. - I certify that all products supplied by the company with the above **Type Tested Manufacturer's** reference number will be manufactured and tested to ensure that they perform as stated in this document, prior to shipment to site and that no site **Modifications** are required to ensure that the product meets all the requirements of EREC G99.

This declaration must be signed by the Manufacturer of the equipment

This declaration must be signed by the Manufacturer of the equipment

Signed		On behalf of	
--------	--	--------------	--

Note that testing can be done by the **Manufacturer** of an individual component or by an external test house.

Where parts of the testing are carried out by persons or organisations other than the **Manufacturer** then that person or organisation shall keep copies of all test records and results supplied to them to verify that the testing has been carried out by people with sufficient technical competency to carry out the tests.

A2-2 Compliance Verification Report – Tests for Type A Synchronous Power Generating Modules > 50 kW and also for Synchronous Power Generating Modules ≤ 50 kW where the approach of this form is preferred to that in Form A2-1 – Test record

This section is mandatory ahead of site testing as part of Form A2-1.

This section is mandatory ahead of site testing as part of Form A2-1.

1. Operating Range: Two tests should be carried with the **Power Generating Module** operating at **Registered Capacity** and connected to a suitable load bank, test supply, or grid simulation set. The power supplied by the primary source shall be kept stable within ± 5 % of the apparent power value set for the entire duration of each test sequence.

The Power Generating Module must be connected to a suitable test supply, grid simulation set or load bank as part of the test.

Frequency, voltage and **Active Power** measurements at the output terminals of the **Power Generating Module** shall be recorded every second. The tests will verify that the **Power Generating Module** can operate within the required ranges for the specified period of time.

The **Interface Protection** shall be disabled during the tests.

The evidence provided by the manufacturer / developer / installer must show that the Power Generating Module can fulfil the test requirements. The second by second evidence must be within the parameters set in column 1.

Compliance with the tests, detailed in column 1, must be evidenced. As per the requirements, evidence must demonstrate that all four test conditions have been met by providing the frequency, voltage and active power recordings for every second of each test.

Test 1
Voltage = 85% of nominal ((195.5 V),
Frequency = 47 Hz,
Power Factor = 1,
Period of test 20 s

Test 2
Voltage = 85% of nominal (195.5 V),
Frequency = 47.5 Hz,
Power Factor = 1,
Period of test 90 minutes

Test 3
Voltage = 110% of nominal (253 V),
Frequency = 51.5 Hz,
Power Factor = 1,
Period of test 90 minutes

Test 4
Voltage = 110% of nominal (253 V),
Frequency = 52.0 Hz,
Power Factor = 1,
Period of test 15 minutes

2. Power Quality – Harmonics:

The installation must be designed in accordance with EREC G5. For **Power Generating Modules** of up to 17 kW per phase or 50 kW three phase harmonic measurements as required by BS EN 61000-3-12 shall be made and recorded in a test declaration as in Form A2-1. The relevant part of Form A2- 1 can be used for this purpose.

This section is mandatory. Part 2 of Form A2-1 must be completed.

3. Power Quality – Voltage fluctuations and Flicker:

The installation must be designed in accordance with EREC P28.

For **Power Generating Modules** of up to 17kW per phase or 50kW three phase the voltage fluctuations and flicker emissions from the **Generating Unit** shall be measured in accordance with BS EN 61000-3-11

This section is mandatory ahead of on-site testing.

This section is mandatory. Part 3 of Form A2-1 can be used to confirm compliance along with test sheets.

4. Power Factor: Manufacturers' Information shall be provided or factory test results or on site testing in respect of the operation of the control system at 0.94 pu V, 1.0 pu V and 1.1 pu V shall be undertaken. The test can be undertaken by stepping the network voltage such as via an appropriate transformer/tap changer, or alternatively by injecting a test voltage signal into the **Controller**.

This test shall be undertaken with the **Controller** in constant **Power Factor** mode and a set point of 1.0.

The tests are successful if the **Power Factor** is > 0.95 (leading and lagging).

This section is mandatory ahead of on-site testing.

This section is mandatory. Part 4 of Form A2-1 can be used to confirm compliance along with test sheets.

5. Protection operation and stability– Frequency tests: See Form A2-4.

Manufacturer to refer to and complete Form A2-4.

Please complete Form A2-4 and include it as part of the application.

6. Protection operation and stability – Voltage tests: See Form A2-4 for **LV** or **HV** as applicable.

Manufacturer to refer to and complete Form A2-4.

Please complete Form A2-4 and include it as part of the application.

7. Protection – Loss of Mains test and Vector Shift and RoCoF Stability test: See Form A2-4.

Manufacturer to refer to and complete Form A2-4.

Please complete Form A2-4 and include it as part of the application.

8. Limited Frequency Sensitive Mode – Over frequency test: The tests below should be carried out using the specific threshold frequency of 50.4 Hz and **Droop** of 10% in accordance with paragraph 11.2.4. The tests should be carried out in accordance with Annex A.7.2.4

Commissioning Engineer to confirm compliance

The test requirements are declared within G99 A.7.2.4 (page 241)

Active Power response to rising frequency/time plots are attached

Y/N

9. Power output with falling frequency test.

Tests should prove that the **Power Generating Module** does not reduce output power as the frequency falls. These tests should be carried out in accordance with Annex A.7.2.3.

Test sequence	Measured Active Power Output	Acceptable Active Power	Primary power source (if applicable)
49.5 Hz for 5 minutes		100% Registered Capacity	
49.5 Hz for 5 minutes		99% Registered Capacity	
48.0 Hz for 5 minutes		97% Registered Capacity	
47.6 Hz for 5 minutes		96.2% Registered Capacity	
47.1 Hz for 20 s		95% Registered Capacity	

This section isn't mandatory ahead of on-site type testing.

The Measured Active Power Output provided by the customer must be equal to or greater than the Acceptable Active Power limit in column 3.

This section can be completed as part of on-site type testing or provided as part of the original application.

The test requirements are declared within G99 A.7.2.2.2 (page 236)

This section can be completed as part of on-site type testing or provided as part of the original application.

10. Protection – Re-connection timer.

Test should prove that the reconnection sequence starts after a minimum delay of 20 s for restoration of voltage and frequency to within the stage 1 settings of Table 10.1.

Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of Table 10.1.			
		At 1.16 pu (266.2 V)	At 0.85 pu (196.1 V)	At 47.4 Hz	At 52.1 Hz
Confirmation that the Power Generating Module does not re-connect.					

To comply with G99 the Power Generating Module must not reconnect within 20s from when voltage or frequency limits are beyond those state in Table 10.1 on page 86 of G99.

This section can be completed as part of on-site type testing or provided as part of the original application.

Table 10.1 is found within G99 section 10.6.7.1 (page 86)

11. Fault level contribution: Manufacturers' Information in respect of the fault level contribution shall be provided.

This data must be provided to the NCD for study purposes. The NCD will confirm whether it is appropriate

This section is mandatory ahead of on-site testing as part of Form A2-1.

12. Wiring functional tests: If required by para 15.2.1.

Confirm that the relevant test schedule is attached (tests to be undertaken at time of commissioning) Yes / NA

If the developer / installer amends wiring and/or connects assets together that are not initially design to connect then additional test are required. Commissioning engineer to confirm on-site test requirements.

If wiring is undertaken on site between assets that are not initially designed to connect then additional testing will be required. See G99 15.2.1 (page 145)

13. Logic interface (input port).

Section 11.1.3 states the Power Generating Module “shall be equipped with a logic interface (input port) in order to cease Active Power Output within 5s”. It is expected that one is installed. If not, the Control Centre must be advised.

Confirm that an input port is provided and can be used to shut down the module.

Yes / NA

Please confirm if a Logic Interface (input port) is installed. This is to reduce the Active Power Output of the Power Generating Module within 5s. If selecting “N/A” please state why in additional comments. See G99 11.1.3 & 11.1.3.1 (page 98)

Additional comments.