



Queensland Emergency Backstop Generation Signalling Device Installation and Compliance Guidelines



Part of the Energy Queensland Group

Queensland GSD Installation and Compliance Guidelines

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1. BACKGROUND

The Australian Energy Market Operator (AEMO) has identified risks to the stability of the electricity grid in Australia on rare occasions when the grid is under stress from a number of factors, including high rooftop solar photovoltaic (PV) generation. For more information, refer to the AEMO factsheets Operating the grid with high roof-top solar generation and Minimum system load.

In September 2022, we carried out an industry consultation on a proposed emergency backstop mechanism that requires selected Inverter Energy Systems (IES) in Queensland, such as rooftop solar PV, to have a Generation Signalling Device (GSD) installed. This device allows us to respond to minimum demand events on our network at the direction of the AEMO. For more information refer to the industry consultation documents and view the September 2022 webinar on our Talking Energy web page.

This requirement to install a GSD for certain systems came into effect on February 6, 2023.

The GSD, which is signalled through our Audio Frequency Load Control (AFLC) system, allows Energex and Ergon Energy Network to stop the output from an IES, such as rooftop solar PV. This will only occur at the direction of the AEMO in rare emergency situations to support the security of power supply across the electricity network. GSD activation will only be instigated by the AEMO after they have implemented other network management options for managing minimum demand risks.

2. SCOPE

This guideline document has been released to enhance clarity of the installation process by providing more supporting information for further understanding of GSD installation for installers (electrical contractors). This document shall be considered in conjunction with the Queensland Electricity Connection Manual (QECM). In the event of any inconsistencies between this document and QECM, the QECM will prevail.

The QECM sets out a range of applicable standards, and industry codes and EQL controlled documents that apply to PV installations. A brief can be found in Appendix: A.

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3. DEFINITIONS AND ABBREVIATION

3.1. DEFINITIONS

Term	Definition
Demand Response	The automated alteration of an inverter mode of operation in response to an initiating signal originating from or defined by the Distributor.
Demand Response Site Controller	A device which interprets the operational instructions from the GSD and operates the Emergency Backstop Mechanism for multiple inverters on a premises.
Distribution Network	A network which is not a transmission network. This Standard refers to the Low Voltage or High Voltage portion of the Distribution Network, in this document, Ergon Energy Network and Energex.
Distribution System	A distribution network, together with the connection assets associated with the distribution network, which is connected to another transmission or distribution system. The relevant distribution system owned and operated by the Distributor to which the Small IES Unit(s) is, or will be, connected.
Generation Signalling Device (GSD)	A DRED providing functionalities and capabilities to achieve Demand Response, which satisfies the requirements of AS/NZS 4755.1.
Inverter Energy System (or IES)	A system comprising one or more inverters together with one or more energy sources (which may include an ESS) and controls, typically the inverter(s) satisfies the requirements of AS/NZS 4777.2.
Standard	Refers to a Energex / Ergon Energy Network-controlled document described in Appendix: A

3.2. ABBREVIATIONS

Term, abbreviation, or acronym	Definition
AEMO	Australian Energy Market Operator
AFLC	Audio Frequency Load Control
AS/NZS	A jointly developed Australian and New Zealand Standard
DRED	Demand Response Enabling Device
DNSP	Distribution Network Service Provider
ESS	Energy Storage System
IPR	Interface Protection Relay
GSD	Generation Signalling Device
IES	Inverter Energy System
PD	Protection Device
NEL	National Electricity Law
EQL	Energy Queensland Ltd
PV	Photovoltaic
MSB	Main Switchboard
QECM	Queensland Electricity Connection Manual

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4. GSD REQUIREMENTS

4.1. EMERGENCY BACKSTOP MECHANISM

4.1.1. GENERAL

The installers of IES required under Connection Standards STNW1170 , STNW1174, STNW3510, and STNW3511 to be configured for the Emergency Backstop Mechanism shall ensure that the GSD is installed in compliance with the latest QECM rules.

4.1.2. INSTALLATION REQUIREMENTS

The following requirements apply to a GSD for distribution connected units that are to have an emergency backstop mechanism under clause 8.10.2 of the QECM:

- (a) GSDs shall be installed in compliance with AS/NZS 3000.
- (b) A connection with inverters which are required to have GSDs shall meet the requirements of the relevant wiring diagrams, based on aggregate inverter capacity at the premises as per QECM.
- (c) The GSD shall be located in either:
 - (i) the main switchboard; or
 - (ii) the distribution board with the protective device for inverter supply; or
 - (iii) in the same enclosure as the distribution connected unit Interface Protection Relay (IPR).
Where the aggregated system capacity of all inverters indicates an IPR is required.
- (d) Where the aggregated system capacity of all inverters indicates an IPR is required, the GSD shall be installed in parallel with the IPR in a fail-safe configuration.
- (e) The GSD control cable may be extended as required
- (f) The GSD control cable shall connect:
 - (i) directly to the inverter.
 - (ii) to the inverter via the external device used to provide demand response mode, where the inverter does not have an integrated device; or
 - (iii) to the inverter via a demand response site controller where compliant with the relevant drawing, based on aggregate inverter capacity at the premises.
- (g) Where a wireless communication channel or device is enabled for the demand response site controller, the communication link shall meet the following requirements:
 - (i) have a supervised wireless communications link; and
 - (ii) have a communication delay that does not exceed 0.5 seconds; and
disconnect the inverters from the distribution system for any loss of communications longer than 5 seconds.

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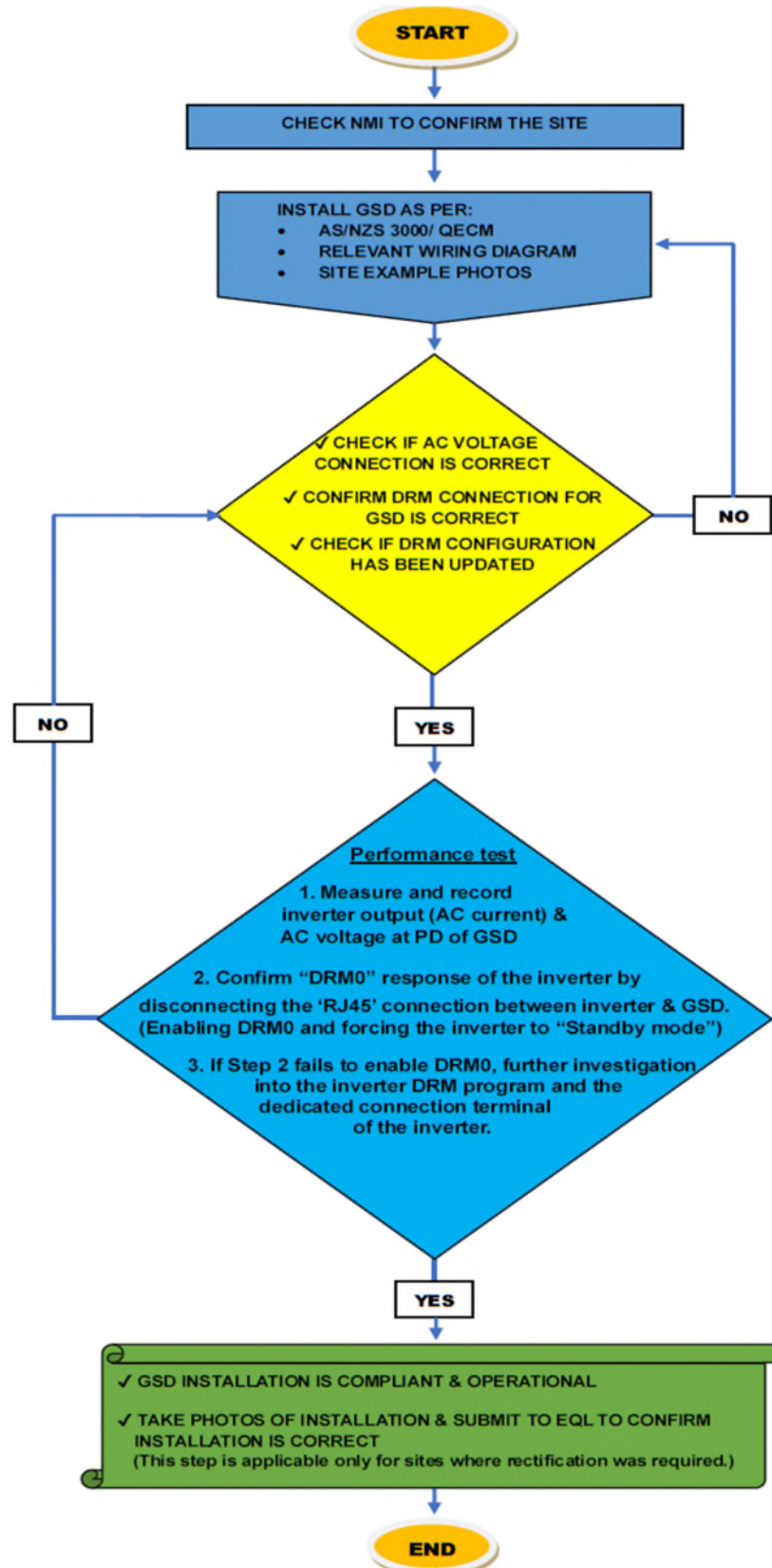
4.1.3. ADDITIONAL RESOURCES

More information can be found through the following links which have been published on Energex / Ergon Energy websites.

Key items	Information source	Link
Why backstop mechanism is required for PV customers	Emergency Backstop Mechanism Factsheet	Emergency Backstop Mechanism- Energex Emergency Backstop Mechanism- Ergon
Which IES connections must be installed GSD device	FAQ	FAQ Results Energex
How to check NMIs in AFLC areas	NMI check tool	NMI


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4.2. STEP-BY-STEP GSD INSTALLATION AND TESTING PROCESS



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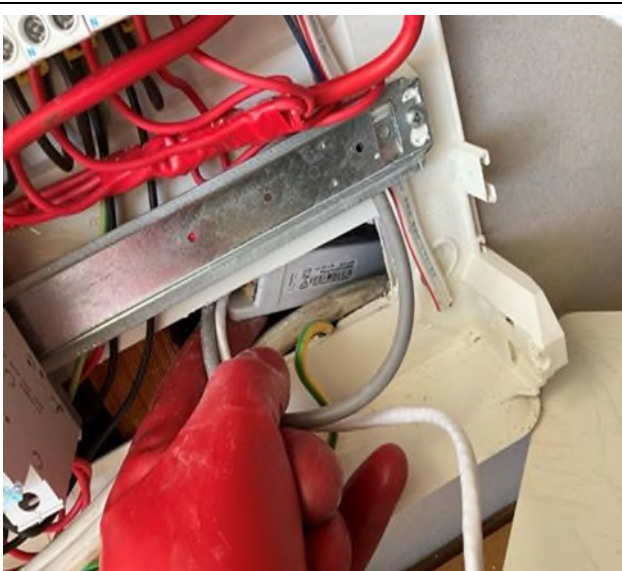
4.3. EXAMPLES OF COMPLIANT INSTALLATIONS

Object: GSD	Compliance Status: Compliant	Reasons: Correct location and inverter settings, DRM0 active	Rectification: Not required
 <p>Correct installation</p>	 <p>Correct location</p>	 <p>Correct installation in alternative enclosures where panel space is limited.</p>	 <p>Inverter ramps down in DRM0 test</p>

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4.4. EXAMPLES OF NON-COMPLIANT INSTALLATIONS

The following examples show non-compliant installation due to reasons indicated below.

Object: GSD	Compliance Status: Non-compliant	Reasons: Incorrect location, DRM0 not active	Rectification: Urgent repair / reinstall required
 <p>Incorrect location</p>			 <p>Exposed to water ingress and UV</p>
			 <p>Inverter does not ramp down -DRM0 test fail</p>
			 <p>Incorrect installation</p>

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4.5. MOUNTING OPTIONS FOR LIMITED PANEL SPACE

In some exceptional cases with limited space, it may not be possible to install GSDs within the main switchboard or distribution board as per the installation requirements. As an alternative, the GSDs may be installed in an additional suitable indoor / weatherproof surface mounted enclosure or large junction box, as close as reasonably practical to the distribution board. This alternative installation must still comply with the installation requirements under clause 8.10.2(d) of the QECM to satisfy the safe, secure, and reliable performance of the GSD.

5. COMPLIANCE AND ENFORCEMENT

Compliance with the backstop installation requirements is an essential part of maintaining system stability during minimum demand events. GSD installations are subject to random audits and inspections by Energex / Ergon Energy Network staff to verify compliance and device performance. Installers will be contacted by Energex / Ergon Energy Network staff to rectify non-compliant installations before initiating enforcement actions.

Category	Description
Compliant (Industry best practice)	The system complies with all relevant standards and requirements for installation. No safety, performance or labelling/documentation issues have been identified. The workmanship and equipment layout are of a high standard. No rectification work is required.
Deemed compliant (Minor defect)	The system complies with almost all the standards and requirements for installation. No safety or significant performance issues have been identified. There have been some non-safety related, minimal risk documentation and/or minor workmanship issues identified. Energex / Ergon Energy Network inspectors will determine if rectification work is required.
Non-compliant (Major defect-serious)	The system does not meet key clauses in the standards and requirements for installation. Rectification work is required within a stipulated timeframe failing which enforcement actions will be initiated.

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5.1. LIKELY CAUSES OF NON-COMPLIANCE

Past audits have indicated following main causes for non-compliant GSD installations:

- GSD not installed or not in the correct location
- DRM0 test fail¹ – inverter does not ramp down

5.2. ENFORCEMENT OPTIONS FOR A NON-COMPLIANT INSTALLATION

A number of enforcement options are available for improving compliance with emergency backstop and the provisions under AS4777.2:

1. Where a non-compliance is identified, the solar retailer/installer responsible for submitting the connection application will be notified, followed by notices to the customer if the non-compliance is not rectified as a matter of priority.
2. Failing to rectify the non-compliance within the stipulated timeframe may result in the distribution connected unit being disconnected from the network, as set out in the customer's connection contract.
3. Installers and retailers that are observed as being consistently non-compliant will be reported to Solar Accreditation Australia (SAA) and other relevant industry bodies for rectification.

¹ Method to test the inverter settings and GSD

Remove the RJ45 plug from the DRM mode port on the inverter, or by disconnecting the GSD from the terminal block. This should trigger the Demand Response Mode (DRM0) functionality to cease generation in accordance with clause 3.2.2 (d) of AS/NZS 4777.2 .

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APPENDIX: A - STANDARDS AND CODES

The QECM sets out a range of applicable standards and industry codes that apply to electrical installations and electrical equipment that are (or intended to be) interconnected to the Distribution Network.

A:1 ENERGEX CONTROLLED DOCUMENTS

A copy of the latest version of the QECM and the Connection Standards can be obtained from the following website:

[Connection information for installers | Energex](#)

Controlled documents include:

Document number	Document name	Document type
STNW1170	Standard for Small IES Connections	Standard
STNW1174	Standard for LV EG Connections	Standard
STNW3510	Dynamic Standard for Small IES Connections	Standard
STNW3511	Dynamic Standard for LV EG Connections	Standard

A:2 ERGON ENERGY CONTROLLED DOCUMENTS

A copy of the latest version of the QECM and the Connection Standards can be obtained from the following website:

[Connection information for installers | Ergon Energy](#)

Controlled documents include:

Document number	Document name	Document type
STNW1170	Standard for Small IES Connections	Standard
STNW1174	Standard for LV EG Connections	Standard
STNW3510	Dynamic Standard for Small IES Connections	Standard
STNW3511	Dynamic Standard for LV EG Connections	Standard

A:3 AUSTRALIAN AND NEW ZEALAND STANDARDS

Document number	Document name	Document type
AS/NZS 3000	Electrical Installations – Wiring Rules	AU/NZ Joint Standard
AS/NZS 4755.1	Demand Response Standard	AU/NZ Joint Standard
AS/NZS 4777	Grid connection of energy systems via inverters, (multiple parts)	AU/NZ Joint Standard