Test Report No.: *Prüfbericht - Nr.:*	**50216454 001**		**Page 1 of 69** Seite 1 von 69
Client: *Auftraggeber:*	**EAST Group Co., Ltd.** No.6 Northern Industry Road, Songshan Lake Sci.& Tech. industrial zone, Dongguan City, Guangdong province, China		
Test item: *Gegenstand der Prüfung:*	Grid-connected PV Inverter		
Identification: *Bezeichnung:*	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA4KSI, EA5KSI	**Serial No.:** Serien-Nr.:	**201808150001**
Receipt No.: *Wareneingangs-Nr.:*	164143376	**Date of receipt:** Eingangsdatum:	**Sep. 19th, 2018**
Condition of test item at delivery: *Zustand des Prüfgegenstandes bei Anlieferung:*	201808150001		
Testing location: *Prüfort:*	**TÜV Rheinland (Shanghai) Co., Ltd.** B1-13F, No. 177, Lane 777, West Guangzhong Road, Zhabei District, Shanghai 200072, P. R. China		
Test specification: *Prüfgrundlage:*	**AS/NZS 4777.2:2015** Grid connection of energy systems via inverters Part 2: Inverter requirements		
Test Result: *Prüfergebnis:*	**The test item has been tested and complies with the above mentioned test specifications.** Der vorstehend beschriebene Prüfgegenstand wurde geprüft und entspricht oben genannter Prüfgrundlage.		
Testing Laboratory/ *Prüflaboratorium:*	**TÜV Rheinland (Shanghai) Co., Ltd.** B1-13F, No. 177, Lane 777, West Guangzhong Road, Zhabei District, Shanghai 200072, P. R. China		

Compiled by/ zusammengestellt:

28/02/2019	Corney Zhang/ Testing Officer	
Datum *Date*	**Name** *Name*	**Unterschrift** *Signature*

Reviewed by/*kontrolliert:*

28/02/2019	Billy Chen/ Reviewer	
Datum *Date*	**Name** *Name*	**Unterschrift** *Signature*

Other Aspects/ Sonstiges:

Abkürzungen:	***P(ass)***	***=***	***entspricht Prüfgrundlage***	***Abbreviations:***	***P(ass)***	***=***	***passed***
	F(ail)	***=***	***entspricht nicht Prüfgrundlage***		***F(ail)***	***=***	***failed***
	N/A	***=***	***nicht anwendbar***		***N/A***	***=***	***not applicable***
	N/T	***=***	***nicht getestet***		***N/T***	***=***	***not tested***

Test Report
AS/NZS 4777.2:2015
Safety of Power Converter for use in Photovoltaic Power Systems
Part 1: General requirements

Test item particulars:

Dimension (mm).: See table 1 of page 3

Mass (kg).: <11.5kg

General remarks:

1. This report shall not be reproduced, except in full.

2. Details in test data / test plan no. 50216454 001.

3. Reporting of results herein is in accordance with CNAS recommendations.
(a) For minimum limits - Where measurement is on the limit or above the limit it is deemed to comply.
Where measurement is below the limit it is deemed not to comply.
(b) For maximum limits - Where measurement is on the limit or below the limit it is deemed to comply.
Where measurement is above the limit it is deemed not to comply.

4. For reporting of results the estimated uncertainty for measurement taken into account.

5. This test report is based on assessment and tests applied to the specific test item(s) as submitted by the client. TÜV Rheinland (Shanghai) Co., Ltd. disclaims any and all responsibility or obligation for any other item.

6. Previous test data has been taken into account in the production of this report.

Description of the test item:

The equipment is single phase utility-interactive type PV inverter which will be installed and connected to the grid network after installation.

It contains filters for smoothing the output voltage and for EMC, switching and control circuits. Electronic circuits are mounted on a number of PCBs interconnected by appropriate connectors and wires. Power board including electronics components is mounted on the heat sink to earthing by metal screw and spring washer.

There are included a RS485 and two RJ45 communication ports which are connected to the monitors to monitor the status of the inverter by proprietary software.

The PV input combiner with 1 string or 2 string MPPT tracers and each MPPT tracer including one PV input terminals. AC output direct connected to grid and Protective Earthing are provided by dedicated earthing terminals. Grid is protected combination with a two series of relays as redundant build for ensure the inverter can independent disconnected from gird while a relay was fault.

During fault condition defined in this standard, after the DSP receives the abnormal signal from the relevant protective detection circuit, the relays will operate to disconnect the PV inverter active lines from grid automatically.

The master DSP and slaver DSP has capacity independent disconnected from gird, when any grid fault had happened.

Model difference:

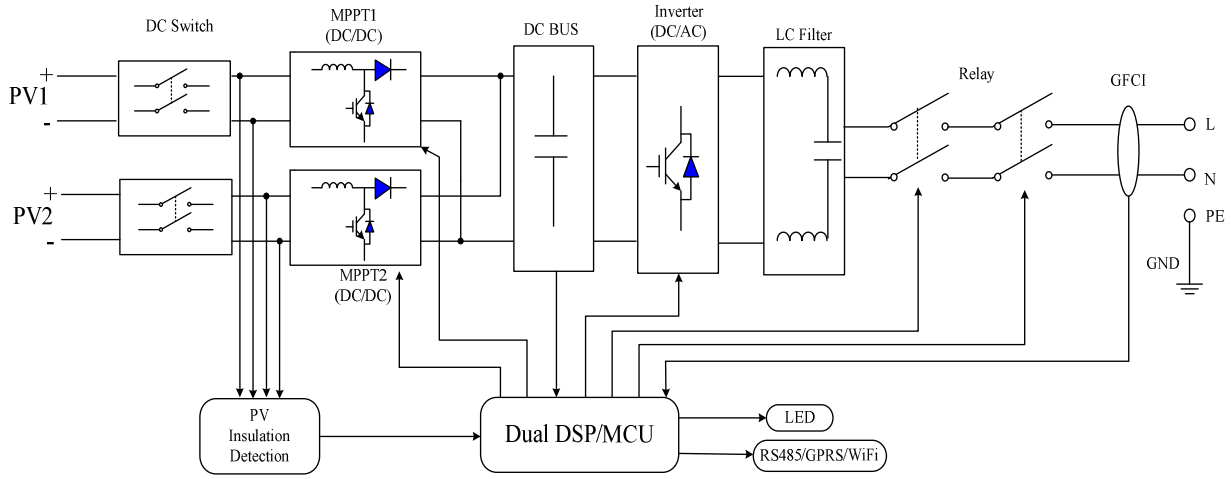
Models EA2KSI, EA2.5KSI and EA3KSI are identical on hardware except the rated power changed by the software.

Models EA3KSI-D, EA4KSI and EA5KSI are identical on hardware except the rated power changed by the software.

The model EA3KSI and model EA5KSI are the same on software and hardware, excepted below components are different:

Table 1

Model / Components	EA2KSI, EA2.5KSI, EA3KSI	EA3KSI-D, EA4KSI, EA5KSI
Max. input current	11A	11A×2
Output current sensor	HLSR 20-P/LEM	HLSR 32-P/LEM
MPPT string	1	2
Boost induct	580uH(11A)*1	580uH(11A)*2
BUS capacitor	1200uF(315V)*4	1200uF(315V)*6
IGBT/MOSFET	IKW40N65H5*5, IKW40N120H3*2	IKW40N65H5*6, IKW40N120H3*2
Power board size	262mm*216mm	322mm*231.5mm
Overall size (WxDxH) [mm]	308x116.5x353	370x126.5x420



Block diagram

The inverters contain Mian board, control board, BUS capacitors and inductors. Main board including power electronics components is mounted on the heat sink through metal screw fixed on the enclosure.

Terminal block for connections to phase line of the grid are provided and protected by a metal enclosure. Grid is protected by electro-mechanical disconnection devices (relays). During fault condition defined in this standard, after the CPU receives the abnormal signal from the relevant protective detection circuit, the relays will operate to disconnect the PV inverter output from grid automatically.

History of revision:

N/A

This test report includes the following Appendixes:		
Appendix No.	Description	Page(s)
1	50216454 001- Clause 9.3.2 Table 15 Inverter Ratings – Marking requirements	7
2	50216454 001-Mark plate	4
3	50216454 001- Table 16 Clause 9.3.2 – Inverter ratings – Documentation requirements	7

Other reports related to this test report:			
Test Report No.	Date	Produced by	Page(s)
50255491 001	01/18/2019	TÜV Rheinland (Shanghai) Co., Ltd.	69
50255491 001 attachment1	01/18/2019	TÜV Rheinland (Shanghai) Co., Ltd.	15
50255491 001 attachment2	01/18/2019	TÜV Rheinland (Shanghai) Co., Ltd.	10
50255491 001 attachment3	01/18/2019	TÜV Rheinland (Shanghai) Co., Ltd.	11

AS/NZS 4777.2:2015			
Clause	Requirement – Test	Result - Remark	Verdict
5	GENERAL REQUIREMENTS		-
5.1	Electrical safety		P
	Inverters for use in inverter energy systems with photovoltaic (PV) arrays shall comply with the appropriate electrical safety requirements of IEC 62109-1 and IEC 62109-2, and the requirements within this Standard.	IEC 62109-1 report no.: 50255491 001 IEC 62109-2 report no.: 50255491 001 attachment 1	P
	Inverters for use in inverter energy systems that have energy storage (batteries) as the only possible energy source shall also comply with the electrical safety requirements of AS 62040.1.1.		N/A
	Inverters for use in inverter energy systems that incorporate energy sources other than photovoltaic (PV) arrays or batteries shall comply with the applicable electrical safety requirements of IEC 62109-1 and IEC 62109-2, and the requirements within this Standard. However, for energy source inputs other than PV arrays or batteries, the requirements of IEC 62109-1 and IEC 62109-2 shall be applied with consideration of the inverter topology, the energy source voltage, installation requirements and potential faults which could present a hazard.		N/A
	Throughout IEC 62109-1 and IEC 62109-2, the term ‘power conditioning equipment (PCE)’ is used. For the purposes of this Standard, ‘PCE’ shall be replaced with the term ‘inverter’.	Considered.	P
5.2	Provision for external connections		P
	Inverters shall be used and installed as fixed equipment only. Inverters shall not be used as portable equipment.	Fixed installation	P
	Inverter provisions for external connection:		P
	(a) shall be for fixed equipment only; and		P
	(b) shall provide for safe and reliable connection to any d.c. source or load or any a.c. source or load.		P
	All inverter ports (except communications ports) shall incorporate connection types for either:		P
	(i) permanently connected equipment; or		P
	(ii) pluggable type B equipment.		N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	Inverter source or load connections shall not incorporate connection types for pluggable type A equipment.	No such connections	N/A
	Permanently connected inverters shall have suitable terminals for connection to fixed installation wiring.		P
	Pluggable type B equipment shall have one of the following means of connection:		N/A
	(A) A non-detachable cord for connection to the supply by means of a connector.		N/A
	(B) An appliance inlet suitable for connection to a matching connector.		N/A
	Pluggable type B equipment shall not incorporate:		N/A
	(1) a connection by a connector or inlet complying with any of the dimensional sheets of AS/NZS 60320.1;	No such connector	N/A
	(2) a connection by a plug conforming to AS/NZS 3112; or	No such connector	N/A
	(3) a connection by a connector or inlet where hazardous voltages are accessible by the standard test finger.	No accessible	N/A
5.3	Photovoltaic (PV) array earth fault/earth leakage detection		P
	For inverter energy systems used with PV array systems that require earth fault detection and a residual current detection, either internal or external to the inverter, the type of detection used shall be declared in accordance with IEC 62109-1 and IEC 62109-2.	See IEC 62109-1 and IEC 62109-2 report.	P
	If an external residual current device (RCD) is required, the manufacturer's installation instructions shall state the need for an RCD and shall specify its rating, type and required circuit location in accordance with Clause 9.	Internal RCD used.	N/A
	Compliance shall be checked by inspection of the inverter's markings and manufacturer's documentation, and testing in accordance with IEC 62109-2.		P
	Where the additional detection for functionally earthed PV arrays, as required by AS/NZS 5033, is present in the inverter, this additional detection shall, before start-up of the system:	Not for functionally earthed PVs	N/A
	(a) open circuit the functional earth connection to the PV array;		P

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Clause	Requirement – Test	Result - Remark	Verdict
	(b) measure the resistance to earth of each conductor of the PV array;		P
	(c) if the earth resistance is above the resistance limit (Riso limit) threshold specified in Table 1, the system shall reconnect the functional earth and shall be allowed to start; and	Refer to the IEC 62109-2 report.	P
	(d) if the earth resistance is equal to or less than the resistance limit (Riso limit) threshold specified in Table 1, the inverter shall shut down and initiate an earth fault alarm in accordance with the requirements of IEC 62109-2.	Refer to the IEC 62109-2 report.	P
5.4	Compatibility with electrical installation		P
	The inverter shall be compatible with wiring practices for LV electrical installations of AS/NZS 3000 and variations as required in AS/NZS 4777.1. The inverter a.c. voltage and frequency operation shall comply with the limits specified in AS 60038 (for Australia), or IEC 60038 (for New Zealand).		P
5.5	Power factor		P
	Compliance shall be determined by type testing in accordance with the power factor test specified in Appendix B.	See appended table 5.5	P
5.6	Harmonic currents		P
	Compliance shall be determined by type testing in accordance with the harmonic current limit test specified in Appendix C.	See appended table 5.6	P
5.7	Voltage fluctuations and flicker		P
	Compliance shall be determined by testing in accordance with the appropriate Standard. The inverter shall remain connected throughout the test and the automatic disconnection device shall not operate.	See appended table 5.7	P
5.8	Transient voltage limits		P
	Compliance shall be determined by type testing in accordance with the transient voltage limit test specified in Appendix D. The voltage-duration curve is derived from the measurements taken at the grid-interactive port of the inverter.	See appended table 5.8	P
5.9	D.C. current injection		P
	Compliance shall be determined by type testing in accordance with the d.c. current injection test specified in Appendix E.	See appended table 5.9	P

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Clause	Requirement – Test	Result - Remark	Verdict
5.10	Current balance for three-phase inverters		N/A
	Compliance shall be determined by type testing in accordance with the following requirement. The a.c. output current for each phase for three-phase balanced current shall be within 5% of the measured value of the other phases at rated current when injected into a balanced three phase voltage.		N/A
6	OPERATIONAL MODES AND MULTIPLE MODE INVERTERS		
6.1	General		P
	Unless otherwise stated, the modes in the following Clauses are for the grid-interactive port of the inverter.		P
6.2	Inverter demand response modes (DRMs)		P
6.2.1	General		P
	Compliance shall be determined by testing as specified in Appendix I.		P
6.2.2	Interaction with demand response enabling device (DRED)		P
	The inverter shall have a means of connecting to a DRED. This means of connection shall include a terminal block or RJ45 socket. The terminal block or RJ45 socket shall comply with the minimum electrical specifications in Table 6. The terminal block or RJ45 socket may be physically mounted in the inverter or in a separate device that remotely communicates with the inverter.	Terminal block mounted in the inverter as responsed DRED enbling devices.	P
	The DRED asserts demand response modes by shorting together terminals or pins as specified in Table 7. In detecting the state of the DRED, the inverter shall comply with the following requirements:		P
	(a) The inverter shall not inject more than 30 mA (d.c. or a.c.) into:	< 30 mA a.c.	P
	(i) terminals ‘DRM1/5’, ‘DRM2/6’, ‘DRM3/7’ or ‘DRM4/8’, where a terminal block is used; or		P
	(ii) pins 1, 2, 3 or 4, where an RJ45 socket is used.	Terminal block used.	N/A
	(b) The inverter shall allow for a drop of up to 1.6 V across the DRED and associated wiring when nominally shorted.	<1.6 V	P
	(c) The inverter shall not supply more than 34.5 V (d.c. or a.c.) to any terminal of the terminal block or RJ45 socket.	<34.5 V	P

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Clause	Requirement – Test	Result - Remark	Verdict
	(d) If the impedance between pins 5 and 6 is detected to be above 20 k□, the inverter shall fail-safe to DRM 0 asserted.		P
	The RJ45 socket pin assignments for demand response modes are as specified in Table 8.		N/A
	The DRED may assert more than one DRM at a time, in which case the requirements of every active DRM that is supported by the inverter shall be simultaneously satisfied.	See appended table 5.9	P
	The inverter shall detect the assertion of any combination of DRMs which result in terminal 5 and 6 being shorted simultaneously as assertion of DRM 0.	See appended table 5.9	P
	Where DRM 3 or DRM 7 are supported, the reactive power set-point shall be set by default to operate at unity power factor. The reactive power set-point should be adjustable up to a minimum of 60% of the inverter's kVA rating.		P
	The inverter may optionally provide a power supply for use by the DRED. If included this shall be d.c. and of a voltage less than 34.5 V.	Not provided.	N/A
	Where an RJ45 socket is used, pins 7 and 8 may be utilized as positive and negative DRED power supply pins respectively. The power supply shall be capable of delivering at least 0.5 A at a minimum of 6 V d.c., otherwise the inverter shall short pins 7 and 8 together.		N/A
	Where a terminal block is used, only those terminals needed for the supported DRMs are required.		P
6.3	Inverter power quality response modes		P
6.3.1	General		P
	The inverter may have the capability of operating in modes which will:		P
	a) contribute to maintaining the power quality at the point of connection with the customer installation; or		P
	b) provide characteristics which are outside the typical operation of an inverter for the purpose of providing support to a grid.		P
	These various operating modes may be enabled or disabled in an inverter and may include the following:		P
	(i) Volt response modes.		P

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Clause	Requirement – Test	Result - Remark	Verdict
	(ii) Fixed power factor or reactive power mode.		P
	(iii) Power response mode.		P
	(iv) Power rate limit.		P
	If these power quality response modes are available in the inverter, the inverter shall comply with the relevant requirements of this Clause (6) and Clause 5, and all of the requirements of Clauses 7 and 8, when these modes are enabled or disabled.		P
	Compliance shall be determined by type testing as specified in Appendix I with the applicable modes disabled and enabled.	See appended table.	P
	If these power quality response modes of operation are controlled by an external device, the external device shall not interfere with the inverter complying with the relevant requirements of this Clause (6) and Clause 5, and all of the requirements of Clauses 7 and 8, when the external device is controlling these modes.		P
	The required characteristics of the power quality response modes are specified below.		P
6.3.2	Volt response modes		P
6.3.2.1	General		P
	The intent of including the volt response modes, which respond to voltage changes at the inverter terminals, is to increase the number of systems which can be connected at a point on the grid without adversely affecting the voltage within an electrical installation.		P
	The volt–watt and volt–var response modes specified in Clause 6.3.2.2 and Clause 6.3.2.3 shall use the volt response reference values specified in Table 9. Each volt response mode may have volt response reference values which are independent of other volt response modes. This is to allow different volt response curves for different volt response modes.		P
6.3.2.2	Volt–watt response mode		P
	The volt–watt response mode varies the output power of the inverter in response to the voltage at its terminal. The inverter should have the volt–watt response mode. If this mode is available, it shall be enabled by default.		P

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Clause	Requirement – Test	Result - Remark	Verdict
	The response curve required for the volt–watt response mode is defined by the volt response reference values in Table 9 and corresponding power levels. The default values are listed in Table 10 and example response modes are shown in Figure 2(A) for Australia and Figure 2(B) for New Zealand.		P
6.3.2.3	Volt–var response mode		P
	The volt–var response mode varies the reactive power output of the inverter in response to the voltage at its grid-interactive port. The inverter should have the volt–var response capability. If this mode is available, it shall be disabled by default.		P
	The response curve required for the volt–var response is defined by the volt response reference values specified in Table 9 and corresponding var levels. The default values are listed in Table 11 and shown in Figure 3.		P
6.3.2.4	Voltage balance modes	No such mode.	N/A
	A voltage imbalance between phases may occur in an electrical installation that presents a load that is not balanced across the phases. Three-phase inverters, or single-phase inverters used in a three-phase combination may be used for voltage balancing between phases by injecting unbalanced three-phase currents into the electrical installation.		N/A
	If the voltage balance mode is available, the following requirements apply:		N/A
	(a) The voltage balance mode shall be disabled by default.		N/A
	(b) For single-phase inverters used in a three-phase combination, the requirements of Clause 8.2 apply.		N/A
	(c) The voltage balancing mode shall be able to		N/A
	(i) operate correctly with a single fault applied;		N/A
	(ii) detect the fault or loss of operability and cause the inverter to revert to injecting current into the three-phase electrical installation as a three-phase balanced current; or		N/A
	(iii) detect the fault or loss of operability and disconnect the inverter from the electrical installation.		N/A

AS/NZS 4777.2:2015			
Clause	Requirement – Test	Result - Remark	Verdict
6.3.3	Fixed power factor mode and reactive power mode		P
	The fixed power factor mode and the reactive power mode may be required in some situations by the electrical distributor to meet local grid requirements. These modes shall be disabled by default.		P
	If the inverter is capable of operating with reactive power mode, the maximum ratio of reactive power (vars) to rated apparent power should be 100%. The reactive power modes may be required to be fixed at a constant reactive power by the electrical distributor.		P
	If the inverter is capable of operating with fixed power factor mode, the minimum range of settings should be 0.8 leading to 0.8 lagging. The fixed power factor mode is for control of the displacement power factor over the range of inverter power output.		P
6.3.4	Characteristic power factor curve for cos φ (P) (Power response)		P
	The characteristic power factor curve for cos φ (P) (Power response) mode varies the displacement power factor of the output of the inverter in response to changes in the output power of the inverter, i.e. cos φ (P) modes. If this mode is available, it shall be disabled by default.		P
	The response curve required for the cos φ (P) response should be defined within displacement power factor range of 0.9 leading to 0.9 lagging. One possible cos φ (P) curve is shown in Figure 4.		P
6.3.5	Power rate limit		P
6.3.5.1	General		P
	The power rate limit for an inverter is a power quality response mode. The inverter shall have the capability to rate limit changes in power generation through the grid-interactive port. Inverters capable of multiple mode operation should have the capability to rate limit changes in power consumption (for example increasing/decreasing of charging rates of connected energy storage).		P
	The power rate limit only applies to the changes specified in Clause 6.3.5.3.		P

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Clause	Requirement – Test	Result - Remark	Verdict
	The power rate limit does not apply when the inverter disconnection device is required to operate (i.e. to disconnect).		P
6.3.5.2	Gradient of power rate limit		P
	The power rate limit (WGra) is the ramp rate of real power output in response to changes in power and is defined as a percentage of rated power per minute. The nominal ramp time (Tn) is the nominal time for a 100% change in output power with a power rate limit of WGra. An inverter shall have an adjustable power rate limit (WGra) which limits the change in power output to the set power rate limit. The default setting for the power rate limit (WGra) for increase and decrease shall be 16.67% of rated power per minute which is a nominal ramp time of 6 min.	See appended table 6.3.5.2	P
	The power rate limit (WGra) shall be adjustable within the range 5% to 100% of rated power per minute. It is acceptable to have two separate power rate limits for increase and decrease in output power, as follows:	Adjustable	P
	(a) To rate limit an increase in power (W_{Gra+}).	See appended table 6.3.5.2	P
	(b) To rate limit a decrease in power (W_{Gra-}).		P
6.3.5.3	Power rate limit modes		P
6.3.5.3.1	General		P
	The inverter power rate limit (W_{Gra}) is applicable to operate in the following modes:		P
	(a) Soft ramp up after connect or reconnect.		P
	(b) Changes in a.c. operation and control.		P
	(c) Changes in energy source operation.		P
	The following subclauses provide operation information for each mode.		P
6.3.5.3.2	Soft ramp up after connect or reconnect		P
	All inverters shall have this mode. This mode shall be enabled as per Clause 7.7 and for the increase in power required by Clause 7.5.3 after frequency decreased to the required limit.		P
6.3.5.3.3	Changes in a.c. operation and control		P

AS/NZS 4777.2:2015			
Clause	Requirement – Test	Result - Remark	Verdict
	If available, this mode shall be enabled for a change in a demand response mode of Clause 6.2 (except for DRM 0). When a demand response mode of Clause 6.2 (except for DRM 0) is asserted or unasserted the power rate limit (WGra) shall apply to the increase or decrease in power generation or consumption and the transitions between power output levels.		P
	The power rate limit for changes in a.c. operation and control does not apply to those inverters that are correcting for sags and swells of less than 1 min.		P
6.3.5.3.4	Changes in energy source operation		P
	This mode only applies to multiple mode inverters with energy storage. It operates when there is a change in the energy resource available to the inverter, which causes a change in output through the grid-interactive port.		P
	For this mode the power rate limit (W_{Gra}) should apply to the increase or decrease in power generation or consumption, and to the transitions between power output levels. For this mode, the power rate limit (W_{Gra}) should be able to be enabled or disabled.		P
	The power rate limit shall be disabled by default. The increase or decrease for transitions between power output levels is contingent on external situations (such as amount of available solar energy, wind energy or discharge capacity). Only for increases or decreases in the output which are faster than the power rate limit (W_{Gra}) does a control action to limit the ramp rate apply.		P
6.3.5.4	Nonlinearity of power rate limit changes		P
	The nonlinearity (NL) of the power rate limit (WGra) in response to an increase of the inverter power output, as defined by the characteristic curve depicted in Figure 5, shall be less than 10%.	See appended table	P
6.4	Multiple mode inverter operation	Only grid-connected inverter.	N/A
6.4.1	General		N/A
	The requirements in this Clause for multiple mode inverters are in addition to the requirements for inverters.		N/A

AS/NZS 4777.2:2015			
Clause	Requirement – Test	Result - Remark	Verdict
	When the multiple mode inverter is disconnected from the grid any stand-alone port shall ensure that all active conductors are also isolated from the grid-interactive port.		N/A
	Multiple mode inverters shall be arranged to ensure that the continuity of the neutral conductor to the load from the electrical installation is not interrupted when the inverter disconnects from the grid and supplies a load via the stand-alone port.		N/A
	Multiple mode inverters shall be arranged such that only the allowed installation methods of AS/NZS 3000 and AS/NZS 4777.1 can be used.		N/A
	When the multiple mode inverter is providing the stand-alone function and is disconnected from the grid, the stand-alone port shall comply with the requirements for d.c. current injection (refer to Clause 5.9) into the connected load circuits. The type of RCD compatible with and for use on the stand-alone function outputs shall be declared.		N/A
6.4.2	Sinusoidal output in stand-alone mode		N/A
	The a.c. output voltage waveform of a stand-alone port of a multiple mode inverter operating in stand-alone mode, shall comply with the requirements of this Clause (6.4.2). The a.c. output voltage waveform of a stand-alone mode shall have a voltage total harmonic distortion (THD) not exceeding of 5% and no individual harmonic at a level exceeding 5%.		N/A
	Compliance shall be checked by measuring the THD and the individual harmonic voltages with the inverter delivering 5% power or the lowest continuous available output power greater than 5%, and 50% and 100% of its continuous rated power, into a resistive load, with the inverter supplied with nominal d.c. input voltage. The THD measuring instrument shall measure the sum of the harmonics from n = 2 to n = 50 as a percentage of the fundamental (n = 1) component at each load level.	See appended table 6.4.2	N/A
6.4.3	Volt–watt response mode for charging of energy storage		N/A

AS/NZS 4777.2:2015			
Clause	Requirement – Test	Result - Remark	Verdict
	The volt–watt response mode for charging of energy storage varies the power input of the inverter from the grid in response to the voltage at its grid-interactive port. A multiple mode inverter with energy storage which can be charged from the grid shall have this volt–watt response mode. This volt–watt response mode is only active when power from the grid is required to charge the energy storage.	See appended table 6.4.2	N/A
	The response curve required for the volt–watt response is defined by the volt response reference values in Table 9 and corresponding power consumption from the grid through the grid-interactive port for charging energy storage. The default values are listed in Table 12 and shown in Figure 6.	See appended table 6.4.2	N/A
6.5	Security of operational settings		P
	The internal settings of the demand response or power quality response modes of the inverter shall be secured against inadvertent or unauthorized tampering. Changes to the internal settings shall require the use of a tool and special instructions not provided to unauthorized personnel.	6-digits password required	P
	The installer-accessible settings shall be capable of being adjusted within the values specified in this Clause (6).		P
7	PROTECTIVE FUNCTIONS FOR CONNECTION TO ELECTRICAL INSTALLATIONS AND THE GRID		-
7.1	General		P
	There shall be an automatic disconnection device to prevent injection of energy into the point of supply and prevent the formation of an unintentional island with the grid or part thereof when supply is disrupted from the grid.		P
	The automatic disconnection device shall operate:		P
	(a) if supply from the grid is disrupted;		P
	(b) when the grid goes outside preset parameters (e.g. undervoltage / overvoltage, under-frequency/over-frequency); or		P
	(c) when the demand response mode DRM 0 (see Clause 6.2) is asserted.		P

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Clause	Requirement – Test	Result - Remark	Verdict
	For inverter energy systems connected to multiple phases the automatic disconnection device shall operate if any of the above conditions is met on any phase.		P
	The automatic disconnection device may be within the inverter or a separate device.	The automatic disconnection device was within the inverter.	P
	Compliance with this Standard shall be determined by type testing the automatic disconnection device within the inverter or combined with the inverter. Where the automatic disconnection device is separate to the inverter (or inverters), the inverter (or inverters) and the automatic disconnection device shall be tested together as though they are one inverter. Compliance of one combination of inverter and automatic disconnection device does not ensure compliance of either device as part of a different combination. Specific requirements are specified in Clauses 7.2 to 7.8.		P
7.2	Automatic disconnection device		P
	The automatic disconnection device shall prevent power (both a.c. and d.c.) from entering the grid when the automatic disconnection device operates.		P
	The automatic disconnection device shall provide isolation in all live conductors.		P
	Automatic disconnection devices for isolation shall comply with the following requirements:		P
	(a) They shall be capable of withstanding an impulse voltage likely to occur at the point of installation, or have an appropriate contact gap.		P
	(b) They shall not be able to falsely indicate that the contacts are open.		P
	(c) They shall be designed and installed so as to prevent unintentional closure, such as might be caused by impact, vibration or the like.		P
	(d) They shall be devices that disconnect all live conductors (active and neutral) of the inverter from the grid-interactive port.		P

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Clause	Requirement – Test	Result - Remark	Verdict
	(e) They shall be such that with a single fault applied to the automatic disconnection device or to any other location in the inverter, at least basic insulation or simple separation is maintained between the energy source port and the grid-interactive port when the means of disconnection is intended to be in the open state.		P
	(f) They shall be such that with a single fault applied to the automatic disconnection device or to any other location in the inverter, power is prevented from entering the grid.		P
	The automatic disconnection device shall be capable of interrupting at least the rated current.		P
	The settings of the automatic disconnection device shall not exceed the capability of the inverter.		P
	A semiconductor (solid-state) device shall not be used for isolation purposes.	No such device used for isolation	P
7.3	Active anti-islanding protection		P
	The automatic disconnection device shall incorporate at least one method of active anti-islanding protection.		P
	The method used to provide active anti-islanding protection shall be declared.		P
	To prevent islanding, the active anti-islanding protection system shall operate the automatic disconnection device (see Clause 7.2) within 2 s of disruption to the power supply from the grid.	See appended table 7.3, appendix F	P
	Compliance shall be determined by type testing in accordance with the active anti-islanding tests specified in Appendix F or IEC 62116.	See appended table 7.3, appendix F	P
7.4	Voltage and frequency limits (passive anti-islanding protection)		P
	The automatic disconnection device shall incorporate the following forms of passive anti-islanding protection:	See appended table 7.4, appendix G	P
	(a) Undervoltage and overvoltage protection.	See appended table 7.4, appendix G	P
	(b) Under-frequency and over-frequency protection.	See appended table 7.4, appendix G	P

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Clause	Requirement – Test	Result - Remark	Verdict
	For sustained variation of the voltage and frequency beyond each limit specified in Table 13, the automatic disconnection device (see Clause 7.2) shall operate no sooner than the required trip delay time and before the maximum disconnection time.		P
	This requires the inverter to remain in continuous, uninterrupted operation for voltage variations with a duration shorter than the trip delay time specified in Table 13.		P
	Each protective function limit shall be preset and secured against change.		P
	Compliance shall be determined by type testing in accordance with the voltage and frequency limits tests specified in Appendix G.		P
7.5	Limits for sustained operation		P
7.5.1	General		P
	The inverter or inverter energy system shall remain connected over the range of voltages and frequencies that it is required to be compatible with. Refer to Clause 5.4.		P
7.5.2	Sustained operation for voltage variations		P
	The inverter shall operate the automatic disconnection device (see Clause 7.2) within 3 s when the average voltage for a 10 min period exceeds the Vnom_max, where Vnom-max lies in the range 244–258 V.	See appended table 7.5.2, appendix H	P
	The sustained operation for voltage variations shall not interfere with the active and passive anti-islanding requirements of Clauses 7.3 and 7.4.		P
	The limit Vnom-max, shall be preset to the default set-point and may be programmable up to the maximum 258 V. The default set-point for Vnom-max shall be as follows:		P
	(a) In Australia: 255 V.	See appended table 7.5.2, appendix H	P
	(b) In New Zealand: 248 V.	See appended table 7.5.2, appendix H	P
	The 10 min average value shall be compared against the limit Vnom-max at least every 3 s to determine when to disconnect.	See appended table 7.5.2, appendix H	P
	Compliance shall be determined by type testing in accordance with the sustained operation for voltage variations test specified in Appendix H.		P

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Clause	Requirement – Test	Result - Remark	Verdict
7.5.3	Sustained operation for frequency variations		P
7.5.3.1	Response to an increase in frequency		P
	The inverter shall be capable of supplying rated power between 47 Hz and 50.25 Hz for Australia.		P
	The inverter shall be capable of supplying rated power between 45 Hz and 50.25 Hz for New Zealand.		P
	When a grid frequency disturbance results in an increase in grid frequency which exceeds 50.25 Hz, the inverter shall reduce the power output linearly with an increase of frequency until fstop is reached, where fstop lies in the range 51–52 Hz.	See appended table 7.5.3, appendix H	P
	The power level present at the time the frequency reaches or exceeds 50.25 Hz shall be held as the reference power level used to calculate the required response to the increasing frequency.	See appended table 7.5.3, appendix H	P
	When the frequency exceeds f_{stop} the inverter power output shall be ceased (i.e. 0 W). The default set-point for f_{stop} shall be 52 Hz.	52 Hz	P
	The output power shall remain at or below the lowest power level reached in response to an over-frequency event between 50.25 Hz and fstop. This is to provide hysteresis in the control of the inverter. When the grid frequency has decreased back to 50.15 Hz or less for at least 60 s, the power level shall be increased at a rate no greater than the power rate limit (W_{Gra}) of Clause 6.3.5 until the available energy source power is reached. Figure 7(A) shows this.	See appended table 7.5.3, appendix H	P
	Unconstrained power operation may recommence 6 min after the frequency returns to and remains at less than 50.15 Hz.	See appended table 7.5.3, appendix H	P
	Compliance shall be determined by type testing in accordance with the sustained operation for frequency variations test specified in Appendix H.		P
7.5.3.2	Response to a decrease in grid frequency		P
	This requirement applies only to inverters with energy storage.		P
	The inverter shall be capable of charging the energy storage between 49.75 Hz and 52.0 Hz.	See appended table 7.5.3.2, appendix H	P

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Clause	Requirement – Test	Result - Remark	Verdict
	When a grid frequency disturbance results in a decrease in grid frequency which falls below 49.75 Hz, an inverter with energy storage which is charging from the grid port should reduce the power input for charging linearly with a decrease of frequency until fstop-CH is reached, where fstop-CH lies in the range 47–49 Hz.	See appended table 7.5.3.2, appendix H	P
	The power input level for charging present at the time the frequency reaches or falls below 49.75 Hz shall be held as the reference charge rate used to calculate the required response to the decreasing frequency.	See appended table 7.5.3.2, appendix H	P
	When the frequency falls below $f_{stop-CH}$, the inverter should have ceased charging the storage element (i.e. 0 W). The default set-point for $f_{stop-CH}$ should be 49 Hz.	See appended table 7.5.3.2, appendix H	P
	The power input level for charging of the storage element shall remain at or below the lowest charge rate reached in response to a low-frequency event between fstop-CH and 49.75 Hz. This is to provide hysteresis in the control of the inverter.	See appended table 7.5.3.2, appendix H	P
	When the grid frequency has increased back to 49.85 Hz or more for at least 60 s, the charge rate of the storage element may be increased at a rate no greater than the power rate limit (W_{Gra}) of Clause 6.3.5 until the charge rate present at the time of the frequency disturbance is reached. Figure 7(B) shows this.	See appended table 7.5.3.2, appendix H	P
	Unconstrained charging of the storage element may recommence 6 min after the frequency returns to and remains above than 49.85 Hz.	See appended table 7.5.3.2, appendix H	P
	Compliance shall be determined by type testing in accordance with the sustained operation for frequency variations test specified in Appendix H.	See appended table 7.5.3.2, appendix H	P
7.6	Disconnection on external signal		P
	The automatic disconnection device shall incorporate the ability to disconnect on an external signal.		P
	If an external signal or demand response ‘DRM 0’ condition is asserted, the automatic disconnection device shall operate within 2 s.		P
	Compliance shall be determined by type testing as specified in Appendix I.		P

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Clause	Requirement – Test	Result - Remark	Verdict
7.7	Connection and reconnection procedure		P
	Only after all of the following conditions have been met shall the automatic disconnection device operate to connect or reconnect the inverter to the grid:		P
	(a) the voltage of the grid has been maintained within the limits of AS 60038 (for Australia) or IEC 60038 (for New Zealand) for at least 60 s;	See appended table 6.3.5	P
	(b) the frequency of the grid has been maintained within the range 47.5 Hz to 50.15 Hz for at least 60 s;	See appended table 6.3.5	P
	(c) the inverter and the grid are synchronized and in-phase with each other; and	See appended table 6.3.5	P
	(d) no external signal is present or DRM 0 asserted requiring the system to be disconnected.		P
	After the automatic disconnection device operates to connect or reconnect the inverter the output shall rate limit increase in power generation to the set power rate limit (WGra) for increase in power of Clause 6.3.5. Unconstrained power operation may recommence after the automatic disconnection device operates to connect or reconnect the inverter, when either the rated power output is reached or the required output power level of the inverter exceeds the available energy source.	See appended table 6.3.5	P
	Compliance shall be determined by type testing in accordance with the tests as specified in Appendix F and Appendix G.	See appended table 6.3.5	P
7.8	Security of protection settings		P
	The internal settings of the automatic disconnection device shall be secured against inadvertent or unauthorized tampering. Changes to the internal settings shall require the use of a tool and special instructions not provided to unauthorized personnel.	Only can be operated by authorized personnel.	P
	The installer-accessible settings of the automatic disconnection device shall be capable of being adjusted within the limits specified in Clause 7.5.		P
	The manufacturer settings of the automatic disconnection device, specified in Clause 7.4, shall be secured against changes.		P
8	MULTIPLE INVERTER COMBINATIONS		-

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Clause	Requirement – Test	Result - Remark	Verdict
8.1	General		-
	There are installations where multiple inverter energy systems are used and the electrical installation connects at a single point of supply to the grid. Inverter energy systems are often comprised of multiple inverters used in combination to provide the desired inverter energy system capacity or to ensure that voltage balance is maintained in multiple phase connections to the grid.		N/A
	This Clause (8) specifies the requirements and tests for inverter energy systems used in such combinations. If a combination is not tested, it should not be used or external devices should be used in accordance with the requirements of AS/NZS 4777.1.		P
	Possible combinations are single-phase inverters used in parallel, single-phase inverters used in multiple phase installations and three-phase inverters used in parallel.		N/A
8.2	Inverter current balance across multiple phases		P
	In a three-phase inverter system comprised of individual single-phase inverters the a.c. output current should be generated and injected into the three-phase electrical installation as a three-phase balanced current. The maximum current imbalance in a three-phase inverter system comprised of individual single-phase inverters shall be no more than 21.7 A.	Considered.	P
8.3	Grid disconnection		N/A
	When any inverter within the inverter energy system disconnects as required by Clause 7, all inverters within the inverter energy system shall disconnect within 2 s of the first inverter disconnecting. This applies to all inverters used in combination for single-phase or multiple phases.		N/A
8.4	Grid connection and reconnection		N/A
	When multiple inverters are used together in a multiple phase combination, only after all the conditions of Clause 7.7 have been met on all connected phases shall the automatic disconnection device operate to connect or reconnect any inverter of the multiple phase combination to the grid.		N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	Where any inverter used in a multiple phase combination has a rated current exceeding 21.7 A per phase, the requirement of Clause 8.2 shall be met when connecting or reconnecting.		N/A
8.5	Testing combinations		N/A
8.5.1	Single-phase combinations		N/A
	Single-phase parallel combinations of inverters shall be tested for combinations with total rated current (Irated) equal to or up to the maximum of 6 A per phase.		N/A
	To determine the number of inverters to be tested, the following equation shall be used: $N = \frac{6}{I_{rated}}$		N/A
	If N ≥ 2, the minimum number of inverters to be tested shall be N. If N > 6, the maximum number of inverters to be tested in a combination shall be 6.		N/A
8.5.2	Single-phase inverters used in three-phase combinations		N/A
	For single-phase inverters with rated current (Irated) greater than or equal to 5 A used in three-phase combinations, three inverters shall be tested in a three-phase arrangement [refer to Figure 8(a)].		N/A
	Single-phase inverters with rated current less than 5 A and to be used in three-phase combinations shall be tested in combination with at least two inverters per phase [refer to Figure 8(b).		N/A
8.5.3	Required tests for multiple inverter combinations		N/A
	Any single-phase inverter used in a multiple inverter combination shall be tested individually and meet all the requirements of this Standard. Any single-phase inverter which is to be used as part of a multiple inverter combination shall be tested in combination as specified in Clauses 8.5.1 and 8.5.2.		N/A
	The tests specified in Table 14 for multiple inverter combinations shall be performed.		N/A
	Compliance shall be determined by type testing as specified in Appendix J.		N/A

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Clause	Requirement – Test	Result - Remark	Verdict
8.5.4	Multiple inverters with one automatic disconnection device		N/A
	Where the inverter does not have an internal automatic disconnection device, or requires an external automatic disconnection device to provide the required disconnection function, or both, testing shall be conducted with the automatic disconnection device and with either the number of inverters required by Clause 8.5.1 and 8.5.2 or with the automatic disconnection device configured with the number of inverters specified by the manufacturer's instructions.	Inverter has internal disconnection device	N/A
	Compliance shall be determined by performing all of the type tests specified in Clause 5.		N/A
9	INVERTER MARKING AND DOCUMENTATION		-
9.1	General		P
	The inverter shall comply with the marking and documentation requirements of IEC 62109-1 and IEC 62109-2, as varied by this Clause (9).		P
	All markings and documentation shall be in the English language.		P
9.2	Marking		P
9.2.1	General		P
	The following variations apply to the marking requirements of IEC 62109-1 and IEC 62109-2:		P
	(a) Inverters that are designated for use in inverter energy systems incorporating energy sources other than PV arrays or batteries shall bear additional or alternative markings appropriate to the energy source.		P
	(b) Inverters that are designated for use in closed electrical operating areas shall be marked with a warning stating that they are not suitable for installation in households or areas of a similar type or use (i.e. domestic).		P
9.2.2	Equipment ratings		P

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Clause	Requirement – Test	Result - Remark	Verdict
	The inverter shall be marked with its ratings and the ratings of each port, as specified in Table 15. Only those ratings that are applicable to the type of inverter are required. The ratings shall be plainly and permanently marked on the inverter, in a location that is clearly visible after installation.	See appended table 9.2.2	P
9.2.3	Ports		P
	Each port shall be marked with its classification and indicate whether a.c or d.c. voltage as appropriate.		P
	Typical classifications include the following:		P
	(a) PV (photovoltaic).		P
	(b) Wind turbine.		N/A
	(c) Energy storage.		P
	(d) Battery.		P
	(e) Generator.		P
	(f) Grid-interactive.		P
	(g) Stand-alone.		P
	(h) Communications (type).		P
	(i) DRM.		P
	(j) Load.		P
9.2.4	External and ancillary equipment		N/A
	If the inverter requires external or ancillary equipment for compliance with this Standard, the requirement for any such equipment shall be marked on the inverter along with the following or an equivalent statement: ‘Refer to the installation instructions for type and ratings’ or symbol.		N/A
	Any external or ancillary equipment shall be marked in accordance with this Clause (9).		N/A
9.2.5	Residual current devices (RCDs)		P
	Inverter energy systems used with PV array systems require residual current detection in accordance with IEC 62109-1 and IEC 62109-2. The requirements can be met by the installation of a suitably rated RCD external to the inverter or by an RCMU integral to the inverter.	RCD integral to the inverter	P

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Clause	Requirement – Test	Result - Remark	Verdict
	Where an external RCD is required, the inverter shall be marked with a warning along with the rating and type of RCD required. The warning shall be located in a prominent position and written in lettering at least 5 mm high. It shall contain the following or an equivalent statement: **WARNING: AN RCD IS REQUIRED ON THE [NAME] PORTS OF THE INVERTER**		N/A
	If the inverter energy system requires a Type B RCD, the inverter shall be marked with a warning. The warning shall be located in a prominent position and written in lettering at least 5 mm high. It shall contain the following: **WARNING: A TYPE B RCD IS REQUIRED ON THE [NAME] PORTS OF THE INVERTER**		N/A
9.2.6	Demand response modes		P
	The demand response modes supported by the inverter should be permanently marked on the name plate or on a durable sticker located on or near the demand response interface port to indicate the demand response modes of which the unit is capable.	DRM0, 5, 6, 7, 8. See appended label 9.2.6	P
	Figure 9 illustrates an acceptable form of marking. If this form of marking is used, each box shall contain a tick or a cross (if the inverter has that capability) or remain blank (if it does not have that capability). Alternatively, only the modes supported may be marked.		P
	If the physical interface is a terminal block, then		P
	(a) the terminals shall be engraved or otherwise durably marked; or		P
	(b) a permanent label with 'DRM Port' shall be affixed near the terminal block.		P
	The marking shall indicate which terminal corresponds to which demand response mode. The range of markings is indicated against Pins 1 to 6 in Table 7.	See instruction manual	P
	The following contractions are permitted:		P
	(i) 'DRM' may be omitted, e.g. the terminal corresponding to DRM 1 may be marked '1' and the terminal corresponding to DRM 1/5 may be marked '1/5'.	Only Numbers	P
	(ii) 'Common' may be contracted to 'C'.		N/A
	(iii) 'RefGen' may be contracted to 'Gen'.		P

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Clause	Requirement – Test	Result - Remark	Verdict
	(iv) 'Com/DRM 0' may be contracted to 'CD0'.		P
9.3	Documentation		P
9.3.1	General		P
	The documentation supplied with the inverter shall provide all information necessary for the correct installation, operation and use of the system and any required external devices including information specified in Clause 9.2.	Installation and operation manuals	P
	All inverters, including those intended for use in systems incorporating energy sources other than PV arrays or batteries, shall comply with the documentation requirements of IEC 62109-1 and IEC 62109-2.		P
9.3.2	Equipment ratings		P
	The documentation supplied with the inverter shall state the ratings of the inverter and the ratings for each port, as specified in Table 16. Only those ratings that are applicable to the type of inverter are required.	See appended table 9.3.2	P
	For equipment with rated current greater than 16 A per phase, additional documentation requirements apply. See Clause 5.7.	Refer clause 5.7	N/A
9.3.3	Ports		P
	In addition to the requirements of Clause 9.3.2, the documentation supplied with the inverter shall state the following for each port, as a minimum:		P
	(a) Means of connection.		P
	(b) For pluggable equipment type B, the type of matching connectors to be used.		N/A
	(c) External controls and protection requirements.		N/A
	(d) Explanation of terminals or pins used for connection including polarity and voltage.		P
	(e) Tightening torque to be applied to terminals.		P
	(f) Instructions for protective earthing.		N/A
	(g) Instructions for connection of loads and installation of RCD protection to stand-alone ports.		N/A
	(h) The decisive voltage class (DVC).		P
9.3.4	External and ancillary equipment		P

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Clause	Requirement – Test	Result - Remark	Verdict
	Where an inverter or multiple inverter combinations requires external or ancillary equipment for compliance with this Standard, the documentation shall:		N/A
	(a) state the requirement for any such equipment;		N/A
	(b) provide sufficient information to identify the external or ancillary equipment, either by manufacturer and part number or by type and rating; and		N/A
	(c) specify assembly, location, mounting and connection requirements.		P
9.3.5	RCDs		N/A
	Where an external RCD is required, the following or an equivalent statement shall be included in the documentation: 'External RCD Required'. The documentation shall also state the rating and type of RCD required and provide instructions for the installation of the RCD.		N/A
9.3.6	Multiple mode inverters		P
	Where the inverter is capable of multiple mode operation, the documentation shall include the following:		P
	(a) Ratings and means of connection to each source of supply to the inverter or output from the inverter.		P
	(b) Any requirements related to wiring and external controls, including the method of maintaining neutral continuity within the electrical installation to any stand-alone ports as required.		P
	(c) Disconnection means and isolation means.		P
	(d) Overcurrent protection needed.		P
9.3.7	Multiple inverter combinations		P
	Where an inverter has been tested for use in a multiple inverter combination as per Clause 8, the documentation shall include the following:		P
	(a) Valid combinations of inverters.		P
	(b) Installation instructions for correct operation as a multiple inverter combination.		P

APPENDIX A	GENERAL TEST AND REPORTING REQUIREMENTS	P
APPENDIX B	POWER FACTOR TEST	P
APPENDIX C	HARMONIC CURRENT LIMIT TEST	P
APPENDIX D	TRANSIENT VOLTAGE LIMIT TEST	P
APPENDIX E	DC INJECTION TEST	P
APPENDIX F	ACTIVE ANTI-ISLANDING TEST	P
APPENDIX G	VOLTAGE AND FREQUENCY LIMITS (PASSIVE ANTI-ISLANDING PROTECTION) TEST	P
APPENDIX H	LIMITS FOR SUSTAINED OPERATION	P
APPENDIX I	DEMAND AND POWER QUALITY RESPONSE MODE TESTING INCLUDING DISCONNECTION ON EXTERNAL SIGNAL	P
APPENDIX J	MULTIPLE INVERTER TESTING	N/A
APPENDIX K	RELATED DOCUMENTS (Informative)	Noted

Table 5.5, Appendix B	TABLE: Displacement Power Factor test					P
EA5KSI						
Mode	I/Irated	15%	25%	50%	75%	100%
Unity	Current (A)	3.2	5.3	10.3	15.6	20.6
	Reactive power (var)	71.8	59.7	20.5	31.3	73.6
	pf (cos φ)	0.995	0.999	0.999	1.000	1.000
	Leading (=LD)/Lagging (=LG)	LD	LD	LD	LG	LG
	Limits	-	>0.95	>0.95	>0.95	>0.95
Lag limit	Power (W)	-	-	-	-	-
	Reactive power (var)	-	-	-	-	-
	pf (cos φ)	-	-	-	-	-
Lead limit	Power (W)	-	-	-	-	-
	Reactive power (var)	-	-	-	-	-
	pf (cos φ)	-	-	-	-	-
Modes	Power (W)	-	-	-	-	-
	Reactive power (var)	-	-	-	-	-
	pf (cos φ)	-	-	-	-	-
Note:						

Table 5.6, Appendix C	TABLE: Harmonic current limit test				P
EA5KSI					
Current A	10.6		21.3		
Current I/In[%]	50%		100%		Limit
Order number	Measurement				
	[A]	[%]	[A]	[%]	[%]
2	0.068	0.547	0.068	0.277	1.0
3	0.161	1.289	0.281	1.139	4.0
4	0.021	0.166	0.035	0.142	1.0
5	0.094	0.749	0.147	0.596	4.0
6	0.021	0.168	0.040	0.164	1.0
7	0.058	0.460	0.073	0.294	4.0
8	0.014	0.113	0.028	0.113	1.0
9	0.050	0.397	0.054	0.221	2.0
10	0.021	0.164	0.018	0.071	0.5
11	0.044	0.350	0.047	0.190	2.0
12	0.013	0.101	0.019	0.076	0.5
13	0.034	0.273	0.031	0.124	2.0
14	0.014	0.110	0.017	0.070	0.5
15	0.037	0.297	0.036	0.146	1.0
16	0.010	0.079	0.016	0.064	0.5
17	0.032	0.255	0.043	0.174	1.0
18	0.010	0.077	0.014	0.057	0.5
19	0.027	0.212	0.037	0.150	1.0
20	0.012	0.093	0.014	0.057	0.5
21	0.041	0.331	0.047	0.192	0.6
22	0.012	0.096	0.014	0.057	0.5
23	0.024	0.194	0.033	0.133	0.6
24	0.010	0.077	0.013	0.054	0.5
25	0.021	0.171	0.025	0.102	0.6
26	0.009	0.074	0.015	0.059	0.5
27	0.033	0.262	0.053	0.215	0.6
28	0.012	0.092	0.015	0.059	0.5
29	0.017	0.139	0.022	0.088	0.6
30	0.010	0.079	0.014	0.058	0.5
31	0.019	0.148	0.018	0.073	0.6
32	0.010	0.077	0.014	0.057	0.5

33	0.015	0.117	0.033	0.133	0.6
THD 50	1.616		2.12		5
EA2KSI					
Current A	4.4		8.7		
Current I/In[%]	50%		100%		Limit
Order number	Measurement				
	[A]	[%]	[A]	[%]	[%]
2	0.050	0.381	0.105	0.400	1.0
3	0.163	1.228	0.201	0.764	4.0
4	0.008	0.058	0.012	0.045	1.0
5	0.090	0.677	0.128	0.486	4.0
6	0.002	0.018	0.005	0.018	1.0
7	0.079	0.596	0.094	0.358	4.0
8	0.007	0.053	0.007	0.028	1.0
9	0.056	0.424	0.070	0.265	2.0
10	0.003	0.023	0.004	0.014	0.5
11	0.043	0.327	0.051	0.195	2.0
12	0.007	0.053	0.008	0.029	0.5
13	0.028	0.212	0.036	0.136	2.0
14	0.002	0.019	0.002	0.009	0.5
15	0.025	0.187	0.033	0.124	1.0
16	0.005	0.036	0.005	0.021	0.5
17	0.017	0.127	0.023	0.088	1.0
18	0.002	0.013	0.002	0.008	0.5
19	0.015	0.113	0.020	0.078	1.0
20	0.002	0.017	0.004	0.016	0.5
21	0.011	0.086	0.019	0.073	0.6
22	0.003	0.022	0.002	0.009	0.5
23	0.010	0.075	0.015	0.056	0.6
24	0.004	0.027	0.002	0.009	0.5
25	0.008	0.061	0.015	0.057	0.6
26	0.004	0.031	0.005	0.021	0.5
27	0.007	0.050	0.011	0.042	0.6
28	0.002	0.012	0.003	0.012	0.5
29	0.006	0.047	0.011	0.043	0.6
30	0.004	0.027	0.004	0.015	0.5
31	0.003	0.025	0.008	0.032	0.6
32	0.005	0.036	0.002	0.009	0.5

33	0.005	0.036	0.008	0.031	0.6
THD 50	1.66		1.18		5

Voltage harmonic of test grid

Order number	Measurement value		Limits
	[V]	[%]	[%]
2	0.023	0.010	0.2
3	0.333	0.145	0.9
4	0.018	0.008	0.2
5	0.017	0.007	0.4
6	0.016	0.007	0.2
7	0.026	0.011	0.3
8	0.019	0.008	0.2
9	0.014	0.006	0.2
10	0.015	0.007	0.2
11	0.020	0.009	0.1
12	0.014	0.006	0.1
13	0.017	0.007	0.1
14	0.014	0.006	0.1
15	0.016	0.007	0.1
16	0.014	0.006	0.1
17	0.015	0.007	0.1
18	0.014	0.006	0.1
19	0.016	0.007	0.1
20	0.014	0.006	0.1
21	0.017	0.008	0.1
22	0.014	0.006	0.1
23	0.016	0.007	0.1
24	0.014	0.006	0.1
25	0.016	0.007	0.1
26	0.014	0.006	0.1
27	0.024	0.011	0.1
28	0.014	0.006	0.1
29	0.016	0.007	0.1
30	0.014	0.006	0.1
31	0.015	0.007	0.1
32	0.015	0.007	0.1
33	0.020	0.009	0.1
34	0.015	0.007	0.1

35	0.017	0.007	0.1
36	0.015	0.007	0.1
37	0.016	0.007	0.1
38	0.015	0.007	0.1
39	0.017	0.007	0.1
40	0.016	0.007	0.1
41	0.020	0.009	0.1
42	0.016	0.007	0.1
43	0.021	0.009	0.1
44	0.017	0.007	0.1
45	0.018	0.008	0.1
46	0.017	0.007	0.1
47	0.021	0.009	0.1
48	0.017	0.007	0.1
49	0.020	0.009	0.1
50	0.017	0.008	0.1
THD 50	0.16		5

5.7	TABLE: Voltage fluctuations and flicker (EA5KSI)	P
Reference Impedance used:	L=0.24+0.15j, N=0.16+0.16j	

Pst			
Interval	Phase A	Phase B	Phase C
1	0.49	--	--
2	0.10	--	--
3	0.10	--	--
4	0.11	--	--
5	0.10	--	--
6	0.10	--	--
7	0.11	--	--
8	0.11	--	--
9	0.11	--	--
10	0.11	--	--
11	0.11	--	--
12	0.11	--	--

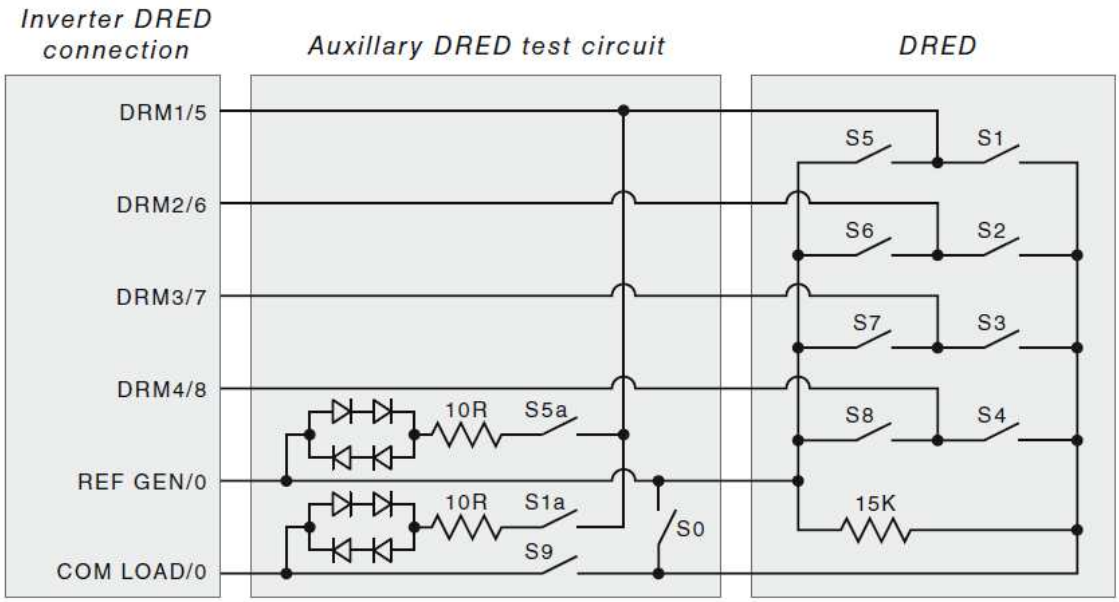
P_{lt} =	0.22	--	--

D_{MAX} =	0.13%	Limit = 4.00%

5.8, Appendix C	TABLE : Transient Voltage test (EA5KSI)			P
Rated power (VA)..... :		4846.26		-
Test output voltage (Vrms) ..... :		230		-
Duration [s]	Transient Voltage Limits [V]	Test output apparent power [VA]		
		10% output	**50% output**	**100% output**
		600	3000	6000
		Measurements of Instantaneous Voltage (Line to Neutral) [V]		
L to N				
0.0002	910	40	334	118
0.0006	710	236	412	104
0.002	580	412	426	392
0.006	470	402	382	400
0.02	420	410	366	400
0.06	390	388	340	374
0.2	390	356	308	344
0.6	390	260	224	254
Note:				

5.9	TABLE: DC Injection, Appendix E						P
EA2KSI							
Output current I/In[%]	100%						
Measurement						Limit	
Phase A		Phase B		Phase C			
[A]	Idc/In [%]	[A]	Idc/In [%]	[A]	Idc/In [%]	[mA]	Idc/In [%]
0.032	0.38	--	--	--	--	42	0.5
Output current I/In[%]	60%						
Measurement						Limit	
Phase A		Phase B		Phase C			
[A]	Idc/In [%]	[A]	Idc/In [%]	[A]	Idc/In [%]	[mA]	Idc/In [%]
0.019	0.22	--	--	--	--	42	0.5
Output current I/In[%]	20%						
Measurement						Limit	
Phase A		Phase B		Phase C			
[A]	Idc/In [%]	[A]	Idc/In [%]	[A]	Idc/In [%]	[mA]	Idc/In [%]
0.016	0.195	--	--	--	--	42	0.5
EA5KSI							
Output current I/In[%]	100%						
Measurement						Limit	
Phase A		Phase B		Phase C			
[A]	Idc/In [%]	[A]	Idc/In [%]	[A]	Idc/In [%]	[mA]	Idc/In [%]
0.042	0.33	--	--	--	--	108	0.5
Output current I/In[%]	60%						
Measurement						Limit	
Phase A		Phase B		Phase C			
[A]	Idc/In [%]	[A]	Idc/In [%]	[A]	Idc/In [%]	[mA]	Idc/In [%]
0.013	0.1	--	--	--	--	108	0.5
Output current I/In[%]	20%						
Measurement						Limit	
Phase A		Phase B		Phase C			
[A]	Idc/In [%]	[A]	Idc/In [%]	[A]	Idc/In [%]	[mA]	Idc/In [%]
0.025	0.2	--	--	--	--	108	0.5

6.2, Appendix I	TABLE: Demand Response Modes (DRMs)	P



Demand response test	Real current		Reactive current		Switching time	Pass/Fail
	Value	Ia/In	Value	Iq/In		
DRM 0 at 100%	0.12	0.01	0.22	0.01	0.254 s	P
DRM 7	14.69	0.68	13.39	0.62	0.805 s	P
DRM 6 and DRM 7	9.94	0.46	13.18	0.61	0.835 s	P
DRM 6	9.94	0.46	1.30	0.06	0.778 s	P
DRM 5 andDRM 6	1.94	0.09	1.30	0.06	0.878 s	P
DRM 8	20.30	0.94	1.73	0.08	0.550 s	P
DRM 3	N/A	N/A	N/A	N/A	N/A	N/A
DRM3 and DRM 2	N/A	N/A	N/A	N/A	N/A	N/A
DRM2	N/A	N/A	N/A	N/A	N/A	N/A
DRM1 and DRM2	N/A	N/A	N/A	N/A	N/A	N/A
DRM4	N/A	N/A	N/A	N/A	N/A	N/A

6.3.2.2	TABLE: Volt-watt response mode	P

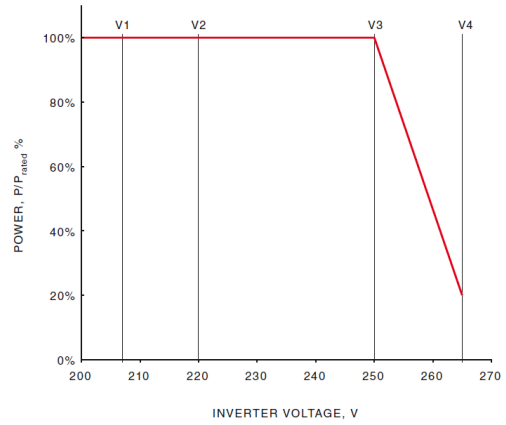


FIGURE 2(A) EXAMPLE CURVE FOR A VOLT–WATT RESPONSE MODE (AUSTRALIA)

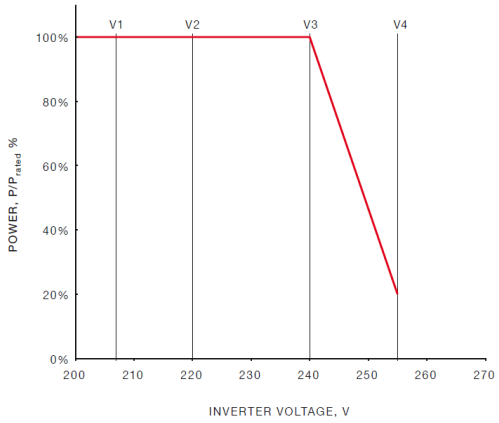
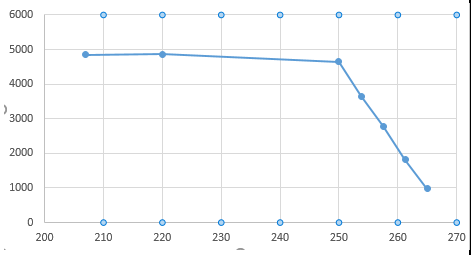


FIGURE 2(B) EXAMPLE CURVE FOR A VOLT–WATT RESPONSE MODE (NEW ZEALAND)

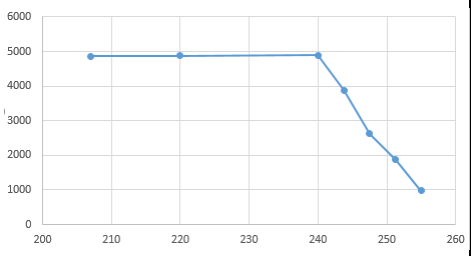
For Australia EA5KSI

AC output				
Voltage setting [V]	Setpoint [P/Pn%]	Measured		
		Voltage [V]	Active power	
			[W]	[P/Pn%]
V1: 207	100	207.68	4848.0	98.94%
V2: 220	100	220.29	4863.1	99.25%
V3: 250	100	249.96	4643.0	94.76%
253.75	80	253.77	3649.8	74.49%
257.50	60	257.44	2781.2	56.76%
261.25	40	261.28	1822.5	37.19%
V4: 265	20	265.13	982.7	20.06%



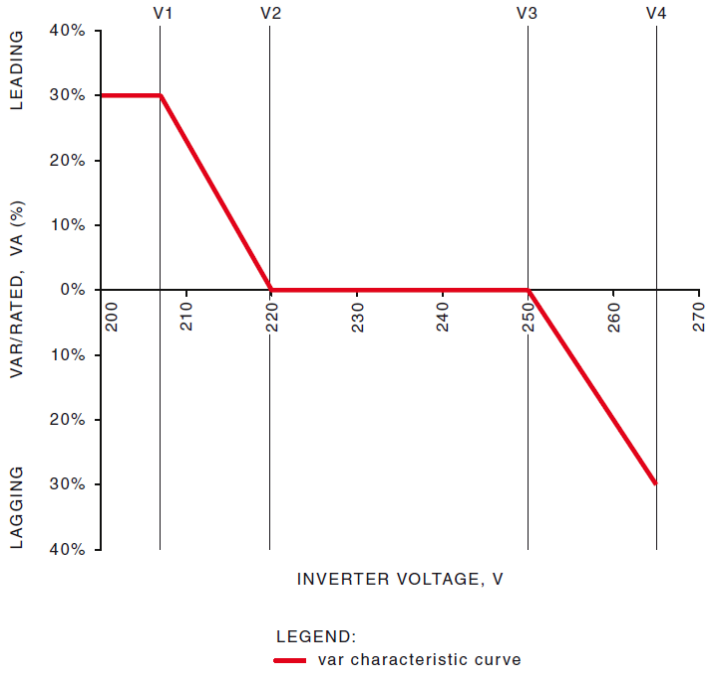
For New Zealand EA5KSI

AC output				
Voltage setting [V]	Setpoint [P/Pn%]	Measured		
		Voltage [V]	Active power [W]	[P/Pn%]
V1: 207	100	208.46	4864.6	98.94%
V2: 220	100	221.41	4876.5	99.25%
V3: 240	100	244.82	4895.8	94.76%
243.75	80	247.26	3884.0	74.49%
247.50	60	249.88	2622.2	56.76%
251.25	40	252.32	1867.0	37.19%
V4: 255	20	254.98	975.1	20.06%



Note: The over/ under voltage protect function was disable during the test.

6.3.2.3, Appendix B	TABLE: Volt-var response mode	P



EA5KSI

AC output					Reactive power Measured		
Voltage setting [V]	Measured				Value [Q/Pn]	Lead/lag	Limits
	Voltage [V]	Active power [W]	Current [A]	[I/In%]			
200	200.72	4117.28	21.47	99.40%	29.53%	Leading	--
V1: 207	207.86	4282.38	21.58	99.91%	29.76%	Leading	--
213.5	213.73	4518.92	21.39	99.03%	15.15%	Leading	--
V2: 220	220.39	4718.16	21.41	99.12%	1.28%	-	--
230.0	230.36	4868.88	21.49	99.49%	1.27%	-	--
240.0	240.31	4864.82	20.37	94.32%	1.31%	-	--
V3: 250	250.35	4900.45	19.62	90.84%	1.31%	-	--
255.0	255.2	3584.55	19.13	88.56%	10.13%	Lagging	--
260.0	259.90	2458.28	18.67	86.45%	17.50%	Lagging	--
V4: 265	265.10	1605.36	18.16	84.12%	30.04%	Lagging	--

6.3.3, Appendix B	TABLE: Fixed power factor mode and reactive power mode	P

EA5KSI

☒**Fixed power factor mode: Lag limit**

AC output					Power factor Measured		
Setting [I/In]	Measured				Value	Lead/lag	Limits
	Active power [W]	Reactive power [Var]	Current [A]	[I/In%]			
15%	731.35	551.70	3.87	17.92	0.798	Lag	--
25%	1226.20	925.37	6.44	29.81	0.798	Lag	0.79 to 0.81
50%	2444.28	1801.44	12.67	58.66	0.805	Lag	0.79 to 0.81
75%	3641.75	2674.57	18.80	87.04	0.806	Lag	0.79 to 0.81
100%	4092.31	2998.90	21.12	97.78	0.807	Lag	0.79 to 0.81

☒**Fixed power factor mode: Lead limit**

AC output					Power factor Measured		
Setting [I/In]	Measured				Value	Lead/lag	Limits
	Active power [W]	Reactive power [Var]	Current [A]	[I/In%]			
15%	728.57	551.22	3.86	17.87	0.797	Lead	--
25%	1221.09	898.54	6.36	29.44	0.805	Lead	0.79 to 0.81
50%	2436.81	1822.71	12.70	58.80	0.801	Lead	0.79 to 0.81
75%	3631.37	2761.66	19.00	87.96	0.796	Lead	0.79 to 0.81
100%	3893.72	2965.34	21.19	98.10	0.796	Lead	0.79 to 0.81

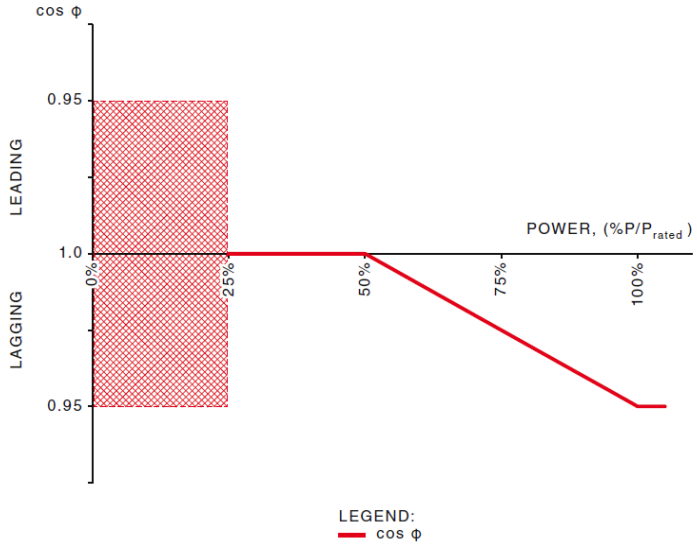
☒ **Fixed reactive power mode: Lag limit**

AC output					Reactive power Measured		
Setting [P/Pn]	Measured				Q/Sn	Lead/lag	Limits – Q/Sn
	Active power [W]	Reactive power [Var]	Current [A]	[P/Pn%]			
15%	736.83	360.41	3.46	15.03	7.36	Lag	--
25%	1233.66	611.14	5.76	25.18	12.47	Lag	≤100%
50%	2468.29	117.73	11.35	50.04	24.07	Lag	≤100%
75%	3690.08	1743.76	16.86	75.31	35.59	Lag	≤100%
100%	4655.58	2193.18	21.21	95.01	44.76	Lag	≤100%

☒ **Fixed reactive power mode: Lead limit**

AC output					Reactive power Measured		
Setting [P/Pn]	Measured				Q/Sn	Lead/lag	Limits – Q/Sn
	Active power [W]	Reactive power [Var]	Current [A]	[P/Pn%]			
15%	734.49	383.98	3.51	14.99	7.84	Lead	--
25%	1230.72	624.53	5.77	25.12	12.75	Lead	≤100%
50%	2464.14	1221.46	11.41	50.29	24.93	Lead	≤100%
75%	3681.92	1862.57	17.06	75.14	38.01	Lead	≤100%
100%	4457.51	2283.43	20.65	90.97	46.60	Lead	≤100%

6.3.4, Appendix B	TABLE: Characteristic power factor curve for cos ϕ (P) (power response)	P

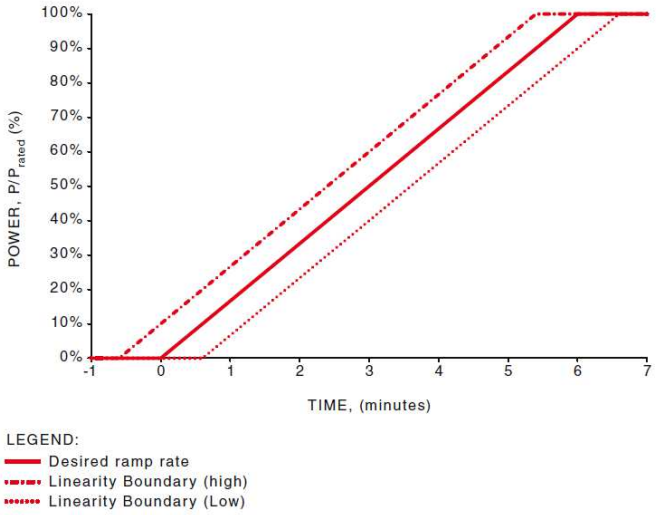


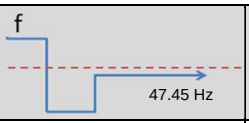
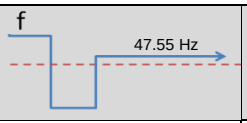
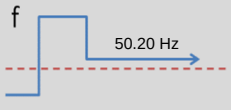
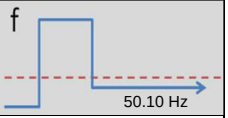
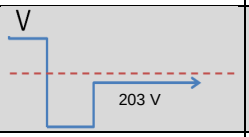
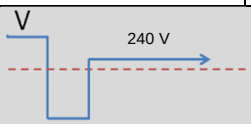
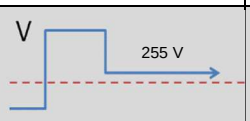
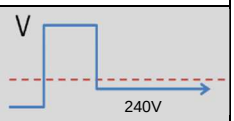
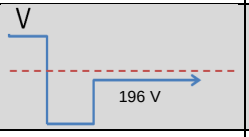
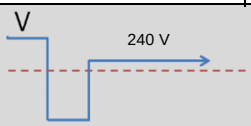
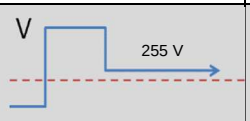
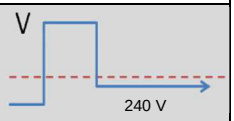
EA5KSI

AC output	Power factor Measured

Setting [P/Pn]	Measured				
	Active power [W]	[P/Pn%]	Reactive power [Var]	PF Value	LD *or* LG
15%	738.19	15.07	70.09	0.995	LD
25%	1237.57	25.26	54.90	0.999	LD
50%	2476.49	50.54	20.04	1.000	LD
60%	2966.26	60.54	7.77	1.000	LG
70%	3426.85	69.94	585.97	0.986	LG
80%	3943.55	80.48	822.53	0.979	LG
90%	4423.66	90.28	1279.70	0.960	LG
100%	4757.69	97.10	1602.16	0.948	LG

6.3.5	TABLE: Power rate limit	P



Conditions				
Reconnection	☐ Yes/ ☒ No	☒ Yes/ ☐ No	☐ Yes/ ☒ No	☒ Yes/ ☐ No
Time [s]	N/A	97	N/A	97
Power rate	N/A	15.3%	N/A	15.2%
Conditions (AS)				
Reconnection	☐ Yes/ ☒ No	☒ Yes/ ☐ No	☐ Yes/ ☒ No	☒ Yes/ ☐ No
Time [s]	N/A	97	N/A	97
Power rate	N/A	15.5%	N/A	15.2%
Conditions (NZ)				
Reconnection	☐ Yes/ ☒ No	☒ Yes/ ☐ No	☐ Yes/ ☒ No	☒ Yes/ ☐ No
Time [s]	N/A	97	N/A	97
Power rate	N/A	15.0%	N/A	15.0%

Note:
Connection time limit: ≥60s
Power rate limit: 16.67%Pn/min

7.3 Appendix F	TABLE: Active anti-islanding protection	P

The method used to provide active anti-islanding protection:	☒ Frequency shift ☐ Frequency instability ☐ Power variation ☐ Current injection ☐ Other:_____
EUT type:	☒ Single PV inverter ☐ Single-phase combination, number of inverter under test_____ ☐ Single-phase inverters used in three phase combinations, number of inverters under test_____

Tested according to IEC62116: 2014

Conditions	P_W [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: -5% Q_C: +5%	L1: 4.43	L1: 4.98	L1: 4.94	1.06	251.0	
	L2: --	L2: --	L2: --	--		2000
	L3: --	L3: --	L3: --	--		
P_R: -5% Q_C: 0%	L1: 4.47	L1: 4.78	L1: 5.0	1.03	801.0	
	L2: --	L2: --	L2: --	--		2000
	L3: --	L3: --	L3: --	--		
P_R: -5% Q_C: -5%	L1: 4.47	L1: 4.56	L1: 5.01	1.01	895.0	
	L2: --	L2: --	L2: --	--		2000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: +5%	L1: 4.7	L1: 5.02	L1: 5.01	1.01	248.5	
	L2: --	L2: --	L2: --	--		2000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: 0%	L1: 4.67	L1: 4.86	L1: 4.98	1.00	847.0	
	L2: --	L2: --	L2: --	--		2000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: -5%	L1: 4.66	L1: 4.53	L1: 4.97	0.97	459.0	
	L2: --	L2: --	L2: --	--		2000
	L3: --	L3: --	L3: --	--		
P_R: +5% Q_C: +5%	L1: 5.0	L1: 5.15	L1: 5.1	0.97	256.0	
	L2: --	L2: --	L2: --	--		2000
	L3: --	L3: --	L3: --	--		
P_R: +5% Q_C: 0%	L1: 5.04	L1: 4.9	L1: 5.1	0.94	850.0	
	L2: --	L2: --	L2: --	--		2000
	L3: --	L3: --	L3: --	--		
P_R: +5% Q_C: -5%	L1: 5.0	L1: 4.61	L1: 5.06	0.92	460.0	
	L2: --	L2: --	L2: --	--		2000

	L3:	--	L3:	--	L3:	--	--		
Power 66%								
Conditions	P_W [kW]		Q_L [kVA]		Q_C [kVA]		Q_f	Trip time [ms]	Limitation [ms]
P_R: 0% Q_C: -5%	L1:	3.13	L1:	3.13	L1:	3.33	0.97	446.0	
	L2:	--	L2:	--	L2:	--	--		2000
	L3:	--	L3:	--	L3:	--	--		
P_R: 0% Q_C: -4%	L1:	3.13	L1:	3.17	L1:	3.33	0.98	883.0	
	L2:	--	L2:	--	L2:	--	--		2000
	L3:	--	L3:	--	L3:	--	--		
P_R: 0% Q_C: -3%	L1:	3.17	L1:	3.25	L1:	3.37	0.98	850.0	
	L2:	--	L2:	--	L2:	--	--		2000
	L3:	--	L3:	--	L3:	--	--		
P_R: 0% Q_C: -2%	L1:	3.19	L1:	3.29	L1:	3.35	0.98	816.0	
	L2:	--	L2:	--	L2:	--	--		2000
	L3:	--	L3:	--	L3:	--	--		
P_R: 0% Q_C: -1%	L1:	3.17	L1:	3.35	L1:	3.37	1.00	319.0	
	L2:	--	L2:	--	L2:	--	--		2000
	L3:	--	L3:	--	L3:	--	--		
P_R: 0% Q_C: 0%	L1:	3.25	L1:	3.47	L1:	3.45	1.00	266.0	
	L2:	--	L2:	--	L2:	--	--		2000
	L3:	--	L3:	--	L3:	--	--		
P_R: 0% Q_C: +1%	L1:	3.23	L1:	3.5	L1:	3.43	1.01	256.5	
	L2:	--	L2:	--	L2:	--	--		2000
	L3:	--	L3:	--	L3:	--	--		
P_R: 0% Q_C: +2%	L1:	3.2	L1:	3.54	L1:	3.43	1.02	245.5	
	L2:	--	L2:	--	L2:	--	--		2000
	L3:	--	L3:	--	L3:	--	--		
P_R: 0% Q_C: +3%	L1:	3.23	L1:	3.58	L1:	3.45	1.02	220.5	
	L2:	--	L2:	--	L2:	--	--		2000
	L3:	--	L3:	--	L3:	--	--		
P_R: 0% Q_C: +4%	L1:	3.2	L1:	3.58	L1:	3.43	1.03	231.0	
	L2:	--	L2:	--	L2:	--	--		2000
	L3:	--	L3:	--	L3:	--	--		
P_R: 0% Q_C: +5%	L1:	3.2	L1:	3.61	L1:	3.43	1.03	218.0	
	L2:	--	L2:	--	L2:	--	--		2000
	L3:	--	L3:	--	L3:	--	--		

Power 33%																		
Conditions	P_W [kW]			Q_L [kVA]			Q_C [kVA]			Q_f	Trip time [ms]	Limitation [ms]
P_R: 0% Q_C: -5%	L1:	1.55		L1:	1.55		L1:	1.67		0.96	460.0	
	L2:	--		L2:	--		L2:	--		--		2000
	L3:	--		L3:	--		L3:	--		--		
P_R: 0% Q_C: -4%	L1:	1.54		L1:	1.59		L1:	1.67		0.98	930.0	
	L2:	--		L2:	--		L2:	--		--		2000
	L3:	--		L3:	--		L3:	--		--		
P_R: 0% Q_C: -3%	L1:	1.55		L1:	1.62		L1:	1.7		0.98	902.0	
	L2:	--		L2:	--		L2:	--		--		2000
	L3:	--		L3:	--		L3:	--		--		
P_R: 0% Q_C: -2%	L1:	1.55		L1:	1.63		L1:	1.67		1.00	846.0	
	L2:	--		L2:	--		L2:	--		--		2000
	L3:	--		L3:	--		L3:	--		--		
P_R: 0% Q_C: -1%	L1:	1.55		L1:	1.65		L1:	1.67		1.01	833.0	
	L2:	--		L2:	--		L2:	--		--		2000
	L3:	--		L3:	--		L3:	--		--		
P_R: 0% Q_C: 0%	L1:	1.55		L1:	1.67		L1:	1.67		1.00	826.0	
	L2:	--		L2:	--		L2:	--		--		2000
	L3:	--		L3:	--		L3:	--		--		
P_R: 0% Q_C: +1%	L1:	1.54		L1:	1.62		L1:	1.59		1.02	777.0	
	L2:	--		L2:	--		L2:	--		--		2000
	L3:	--		L3:	--		L3:	--		--		
P_R: 0% Q_C: +2%	L1:	1.55		L1:	1.72		L1:	1.7		1.02	380.5	
	L2:	--		L2:	--		L2:	--		--		2000
	L3:	--		L3:	--		L3:	--		--		
P_R: 0% Q_C: +3%	L1:	1.55		L1:	1.74		L1:	1.7		1.02	312.0	
	L2:	--		L2:	--		L2:	--		--		2000
	L3:	--		L3:	--		L3:	--		--		
P_R: 0% Q_C: +4%	L1:	1.54		L1:	1.74		L1:	1.76		1.03	283.5	
	L2:	--		L2:	--		L2:	--		--		2000
	L3:	--		L3:	--		L3:	--		--		
P_R: 0% Q_C: +5%	L1:	1.55		L1:	1.76		L1:	1.67		1.04	259.5	
	L2:	--		L2:	--		L2:	--		--		2000
	L3:	--		L3:	--		L3:	--		--		
Remark:												

7.4, Appendix G	**TABLE: Voltage limits (passive anti-islanding protection)**			**P**
Type of automatic disconnection device:	☒ Internal automatic disconnection device ☐ External automatic disconnection device Number of inverters under test:____1____			
AC output power (VA):	2500			
Rated voltage Un:	240			
Setting value				
Voltage detection accuracy [V]		2	Voltage detection cycle Td[ms]	10
Magnitude Vo1 [V]		260	delay time To1 [ms]	1000
Magnitude Vo2 [V]		265	delay time To2 [ms]	200
Magnitude Vu [V]		180	delay time Tu [ms]	1000
O/Voltage level 1	Measurement [V]	Measurement [ms]	Limit [ms]	Remark
1	261.2	1755	1000<t<2000	Mains voltage 254.5 V for 10 min then jump by 1 V in 5 sec intervals from: 257.5 V to 262.5 V
2	261.7	1740		
3	261.3	1780		
Reconnection Time [s]		164	≥ 60s	
O/Voltage level 2	Measurement [V]	Measurement [ms]	Limit [ms]	Remark
1	266.6	159.0	≤ 200	Mains voltage 254.5 V for 10 min then jump by 1 V in 5 sec intervals from: 257.5 V Jump to 266.5 V
2	266.64	160.5		
3	266.52	147.5		
Reconnection Time [s]		175	≥ 60s	
U/Voltage	Measurement [V]	Measurement [ms]	Limit [ms]	Remark
1	181.2	1970	1000<t<2000	Mains voltage 254.5 V for 10 min then jump by 1 V in 5 sec intervals from: 182.5 V Jump to 177.5 V
2	181.1	1900		
3	180.5	1920		
Reconnection Time [s]		94	≥ 60s	

7.4, Appendix G	TABLE: Frequency limits (passive anti-islanding protection)			P
Type of automatic disconnection device:	☒ Internal automatic disconnection device			
	☐ External automatic disconnection device			
	Number of inverters under test:____1____			
AC output power: (VA)	2500			
Rated frequency Fn:	50			
Setting value				
Freq.detection accuracy	0.1 [Hz]	Voltage detection cycle Td[ms]	10	
Over-frequency [Hz]	52	delay time To [ms]	100	
Under-frequency [Hz]	47 (AU) 45 (NZ)	delay time Tu [ms]	1800	

Over frequency	Measurement [Hz]	Measurement [ms]	Limit [ms]	Remark
1	52.10	193.0	200	Mains voltage 50 Hz for 10 min then jump by 0.1 Hz from: 50 Hz to 52.1Hz
2	52.10	179.0		
3	52.10	187.0		
Reconnection Time [s]		88	≥ 60s	U, f, back no rated

Under frequency (AU)	Measurement [Hz]	Measurement [ms]	Limit [ms]	Remark
1	46.95	1340	1000<t<2000	Mains voltage 50 Hz for 10 min then jump by 0.1 Hz from: 50 Hz to 46.9 Hz
2	47.00	1400		
3	47.00	1280		
Reconnection Time [s]		89	≥ 60s	U, f, back no rated

Under frequency (NZ)	Measurement [Hz]	Measurement [ms]	Limit [ms]	Remark
1	45.00	1820	1000<t<2000	Mains voltage 50 Hz for 10 min then jump by 0.1 Hz from: 50 Hz to 44.9 Hz
2	45.00	1880		
3	45.00	1880		
Reconnection Time [s]		84	≥ 60s	U, f, back no rated

7.5.2, Appendix H	**TABLE: Limits for sustained operation**	**P**

AC output power[VA]:

Setting value: V_{nom_max}. 255 V for AS; V_{nom_max}. 248 V for NZ

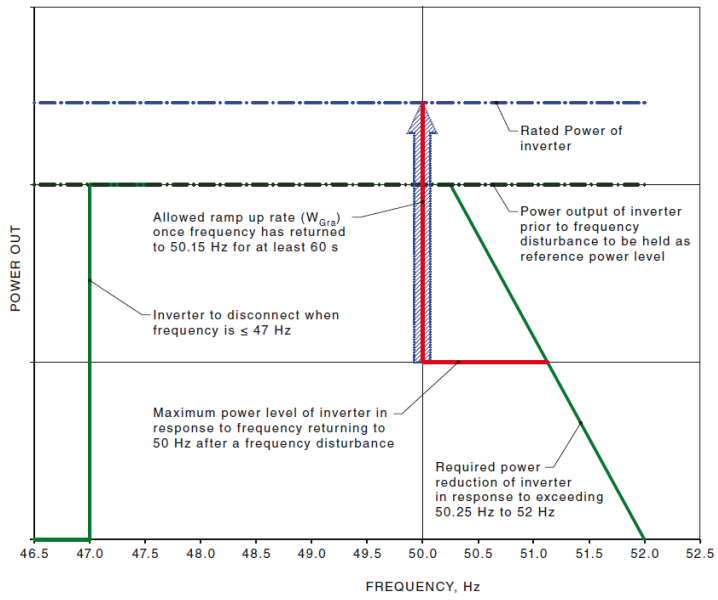
Default setting.	Test no.	U_{start} [V]	U_{end} [V]	"Vmeasured [V] (averge)"	Trigger time [min]	Limitation T [min]
Australia	1	254	256	254.54		
	2	254	256	254.63		
	3	254	256	254.62		
	4	255	257	256.58	0.42	<0.5
	5	Voltage back to 240 V		Reconnection time [s]	198 s	limits >60 s
New Zealand	1	247	249	247.49		
	2	247	249	247.49		
	3	247	249	247.50		
	4	248	249	247.82	0.41	<0.5
	5	Voltage back to 240 V		Reconnection time [s]	86 s	limits >60 s

Note:

Set the AC voltage from grid voltage to U_{start} and maintain for 5min., then adjust the ac voltage to the U_{end} and mantain for 10 min, for Test no. 1,2,3.

Set the AC voltage from grid voltage to U_{start} and maintain for 10min., then adjust the ac voltage to the U_{end} for Test no. 4

7.5.3.1, appendix H	Response to an increase in frequency	P



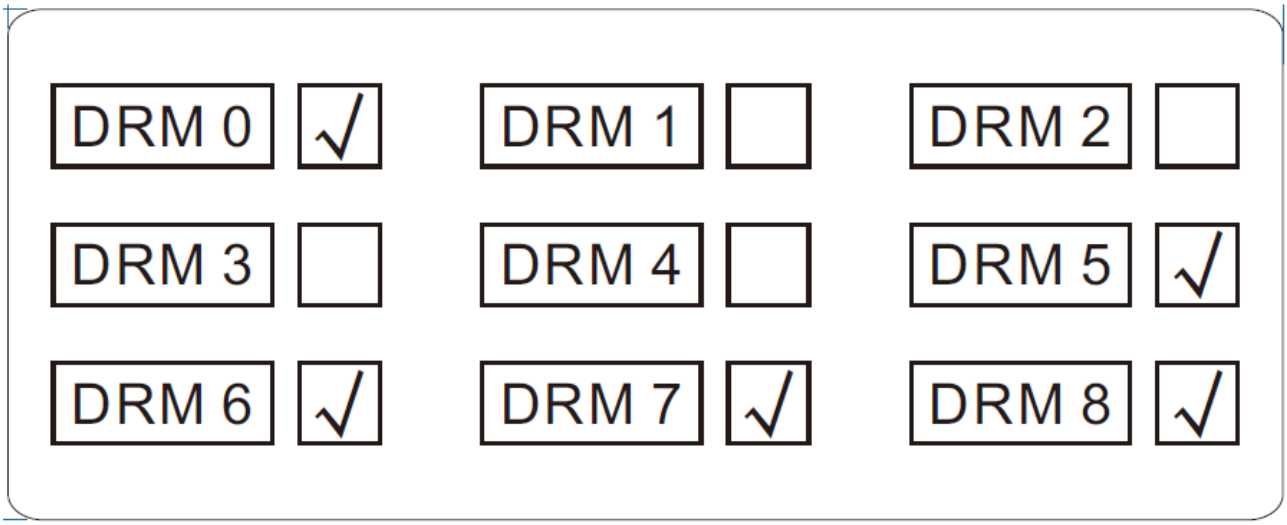
Test 1

Test sequence at power level 50% Sn	Output Power [W]	Frequency [Hz]	Primary Power source [W]	Power gradient %/min
Step a) 50 Hz, maintained for 5min.	2473.55	50.00	--	N/A
Step 1) 50.1Hz	2473.27	50.10	--	N/A
Step 2) 50.25 Hz	2473.11	50.25	--	N/A
Step 3) 50.35 Hz	2340.49	50.35	--	N/A
Step 4) 50.45 Hz	2174.59	50.45	--	N/A
Step 5) 50.55 Hz	2029.19	50.55	--	N/A
Step 6) 50.65 Hz	1887.15	50.65	--	N/A
Step 7) 50.75 Hz	1745.27	50.75	--	N/A
Step 8) 50.85 Hz	1596.98	50.85	--	N/A
Step 9) 50.95 Hz	1454.90	50.95	--	N/A
Step 10) 51.05 Hz	1311.17	51.05	--	N/A
Step 11) 51.15 Hz	1165.91	51.15	--	N/A
Step 12) 51.25 Hz	1022.23	51.25	--	N/A
Step 13) 51.35 Hz	875.70	51.35	--	N/A
Step 14) 51.45 Hz	736.82	51.45	--	N/A
Step 15) 51.55 Hz	589.57	51.55	--	N/A
Step 16) 51.65 Hz	438.69	51.65	--	N/A
Step 17) 51.75 Hz	297.54	51.75	--	N/A
Step 18) 51.85 Hz	155.53	51.85	--	N/A
Step 19) 51.95 Hz	11.61	51.95	--	N/A

Step 20) 52.05 Hz	14.77	52.05	--	N/A
Step 21) 52.1 Hz	11.25	52.10	--	N/A
Step 22) 52.2 Hz	14.04	52.20	--	N/A
Step 23) 52 Hz Deacrese by 0.2Hz every 30s	13.98	52.00	--	N/A
Step 24) 51.8 Hz	14.95	51.80	--	N/A
Step 25) 51.6 Hz	16.27	51.60	--	N/A
Step 26) 51.4 Hz	14.20	51.40	--	N/A
Step 27) 51.2 Hz	14.01	51.20	--	N/A
Step 28) 51.0 Hz	14.79	50.00	--	N/A
Step 29) 50.8 Hz	11.32	50.08	--	N/A
Step 30) 50.6 Hz	16.28	50.06	--	N/A
Step 31) 50.4 Hz	12.74	50.04	--	N/A
Step 32) 50.2 Hz	14.32	50.02	--	N/A
Step 33) 50.0 Hz, maintained until Pmax reached.	4905.22	50.00	--	N/A
Power rate [%Pn/min]	15.0%	Limit	16.67% Pn/min.	
Test 2				
Test sequence at power level 50% Sn	Output Power [W]	Frequency [Hz]	Primary Power source [W]	Power gradient
Step a) 50 Hz, maintained for 5min.	2473.95	50.00	--	N/A
Step 1) 50.1Hz	2474.53	50.10	--	N/A
Step 2) 50.2 Hz	2474.16	50.20	--	N/A
Step 3) 50.3 Hz	2357.08	50.30	--	N/A
Step 4) 50.4 Hz	2193.26	50.40	--	N/A
Step 5) 50.5 Hz	2035.18	50.50	--	N/A
Step 6) 50.6 Hz	1868.84	50.60	--	N/A
Step 7) 50.7 Hz	1727.18	50.70	--	N/A
Step 8) 50.8 Hz	1615.78	50.80	--	N/A
Step 9) 50.9 Hz	1487.61	50.90	--	N/A
Step 10) 51.0 Hz	1332.42	51.00	--	N/A
Step 11) 50.0 Hz	1318.44	50.00	--	N/A
Step 18) 50.0 Hz, maintained until Pmax reached.	2471.90	50.00	--	N/A
Power rate [%Pn/min]	15.4%	Limit	16.67% Pn/min.	

8.2	TABLE: Current balance		N/A
EUT type		Current Unbalance [A]	
☐ Three phase inverter		N/A	
☒ Single-phase inverters used in three-phase combinations		<2A	
--		Limitation [A]	-
--		21.7	N/A
Note: The product is single-phase inverter will not be used in three-phase combinations.			

Label showing available modes of DRM



Appendix 1: Clause 9.3.2 Table 15 Inverter Ratings – Marking requirements

EA2KSI:

INVERTER RATINGS DOCUMENTATION REQUIREMENTS

Port (all that apply)	Parameter	Value	Units
Photovoltaic	Vmax PV (absolute maximum)	600	d.c. V
	PV input operating voltage range	90-550	d.c. V
	Maximum operating PV input current	11	d.c. A
	Isc PV (absolute maximum)	12	d.c. A
	Maximum inverter backfeed current to array	0	a.c. A or d.c. A
Wind (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Current (inrush)	/	a.c. A or d.c. A (peak and duration)
	Frequency (nominal or range) (a.c. wind only)	/	Hz
Energy storage ports	Voltage (nominal or range)	/	d.c. V
	Nominal battery voltage	/	d.c. V
	Rated current (maximum continuous) input and output	/	d.c. A
	Storage type	/	
Other energy sources or inputs (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Power factor (range)	/	
	Frequency (nominal or range) (a.c. sources only)	/	Hz
a.c. output ratings (for each port)	Voltage (nominal or range)	230	a.c. V
	Rated current	8.7	a.c. A
	Current (inrush)	14.3	a.c. A (peak and duration)
	Frequency (nominal or range)	50	Hz
	Rated apparent power	2000	VA
	Power factor range	0.8 cap-0.8ind adjustable (default: 1)	
	Maximum output fault current	18.8	a.c. A (peak and duration)
	Maximum output overcurrent protection	13.47	a.c. A
d.c. output ratings	Voltage (nominal or range)	/	d.c. V
	Rated current	/	d.c. A
	Inverter topology	Non-isolated	
	Active anti-islanding method	ROCOF	
	Protective class (I, II or III)	I	
	Over voltage category	PV: OVC II, AC: OVC III	
	Ingress protection (IP) rating	IP65	
	Temperature operating range	-25-60° C	

NOTE: Table 16 is based on the requirements of IEC 62109-2.

EA2.5KSI:

INVERTER RATINGS DOCUMENTATION REQUIREMENTS

Port (all that apply)	Parameter	Value	Units
Photovoltaic	Vmax PV (absolute maximum)	600	d.c. V
	PV input operating voltage range	90-550	d.c. V
	Maximum operating PV input current	11	d.c. A
	Isc PV (absolute maximum)	12	d.c. A
	Maximum inverter backfeed current to array	0	a.c. A or d.c. A
Wind (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Current (inrush)	/	a.c. A or d.c. A (peak and duration)
	Frequency (nominal or range) (a.c. wind only)	/	Hz
Energy storage ports	Voltage (nominal or range)	/	d.c. V
	Nominal battery voltage	/	d.c. V
	Rated current (maximum continuous) input and output	/	d.c. A
	Storage type	/	
Other energy sources or inputs (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Power factor (range)	/	
	Frequency (nominal or range) (a.c. sources only)	/	Hz
a.c. output ratings (for each port)	Voltage (nominal or range)	230	a.c. V
	Rated current	10.9	a.c. A
	Current (inrush)	17.37	a.c. A (peak and duration)
	Frequency (nominal or range)	50	Hz
	Rated apparent power	2500	VA
	Power factor range	0.8 cap-0.8ind adjustable (defaut: 1)	
	Maximum output fault current	23.5	a.c. A (peak and duration)
	Maximum output overcurrent protection	17	a.c. A
d.c. output ratings	Voltage (nominal or range)	/	d.c. V
	Rated current	/	d.c. A
	Inverter topology	Non-isolated	
	Active anti-islanding method	ROCOF	
	Protective class (I, II or III)	I	
	Over voltage category	PV: OVC II, AC: OVC III	
	Ingress protection (IP) rating	IP65	
	Temperature operating range	-25-60° C	

NOTE: Table 16 is based on the requirements of IEC 62109-2.

EA3KSI:

INVERTER RATINGS DOCUMENTATION REQUIREMENTS

Port (all that apply)	Parameter	Value	Units
Photovoltaic	Vmax PV (absolute maximum)	600	d.c. V
	PV input operating voltage range	90-550	d.c. V
	Maximum operating PV input current	11	d.c. A
	Isc PV (absolute maximum)	12	d.c. A
	Maximum inverter backfeed current to array	0	a.c. A or d.c. A
Wind (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Current (inrush)	/	a.c. A or d.c. A (peak and duration)
	Frequency (nominal or range) (a.c. wind only)	/	Hz
Energy storage ports	Voltage (nominal or range)	/	d.c. V
	Nominal battery voltage	/	d.c. V
	Rated current (maximum continuous) input and output	/	d.c. A
	Storage type	/	
Other energy sources or inputs (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Power factor (range)	/	
	Frequency (nominal or range) (a.c. sources only)	/	Hz
a.c. output ratings (for each port)	Voltage (nominal or range)	230	a.c. V
	Rated current	13	a.c. A
	Current (inrush)	20.44	a.c. A (peak and duration)
	Frequency (nominal or range)	50	Hz
	Rated apparent power	3000	VA
	Power factor range	0.8 cap-0.8ind adjustable (default: 1)	
	Maximum output fault current	28.2	a.c. A (peak and duration)
	Maximum output overcurrent protection	17.73	a.c. A
d.c. output ratings	Voltage (nominal or range)	/	d.c. V
	Rated current	/	d.c. A
	Inverter topology	Non-isolated	
	Active anti-islanding method	ROCOF	
	Protective class (I, II or III)	I	
	Over voltage category	PV: OVC II, AC: OVC III	
	Ingress protection (IP) rating	IP65	
	Temperature operating range	-25-60° C	

NOTE: Table 16 is based on the requirements of IEC 62109-2.

EA3KSI-D:

INVERTER RATINGS DOCUMENTATION REQUIREMENTS

Port (all that apply)	Parameter	Value	Units
Photovoltaic	Vmax PV (absolute maximum)	600	d.c. V
	PV input operating voltage range	90-550	d.c. V
	Maximum operating PV input current	11*2	d.c. A
	Isc PV (absolute maximum)	12*2	d.c. A
	Maximum inverter backfeed current to array	0	a.c. A or d.c. A
Wind (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Current (inrush)	/	a.c. A or d.c. A (peak and duration)
	Frequency (nominal or range) (a.c. wind only)	/	Hz
Energy storage ports	Voltage (nominal or range)	/	d.c. V
	Nominal battery voltage	/	d.c. V
	Rated current (maximum continuous) input and output	/	d.c. A
	Storage type	/	
Other energy sources or inputs (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Power factor (range)	/	
	Frequency (nominal or range) (a.c. sources only)	/	Hz
a.c. output ratings (for each port)	Voltage (nominal or range)	230	a.c. V
	Rated current	13	a.c. A
	Current (inrush)	20.44	a.c. A (peak and duration)
	Frequency (nominal or range)	50	Hz
	Rated apparent power	3000	VA
	Power factor range	0.8 cap-0.8ind adjustable (defaut: 1)	
	Maximum output fault current	28.2	a.c. A (peak and duration)
	Maximum output overcurrent protection	17	a.c. A
d.c. output ratings	Voltage (nominal or range)	/	d.c. V
	Rated current	/	d.c. A
	Inverter topology	Non-isolated	
	Active anti-islanding method	ROCOF	
	Protective class (I, II or III)	I	
	Over voltage category	PV: OVC II, AC: OVC III	
	Ingress protection (IP) rating	IP65	
	Temperature operating range	-25-60° C	

NOTE: Table 16 is based on the requirements of IEC 62109-2.

INVERTER RATINGS DOCUMENTATION REQUIREMENTS

Port (all that apply)	Parameter	Value	Units
Photovoltaic	Vmax PV (absolute maximum)	600	d.c. V
	PV input operating voltage range	90-550	d.c. V
	Maximum operating PV input current	11*2	d.c. A
	Isc PV (absolute maximum)	12*2	d.c. A
	Maximum inverter backfeed current to array	0	a.c. A or d.c. A
Wind (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Current (inrush)	/	a.c. A or d.c. A (peak and duration)
	Frequency (nominal or range) (a.c. wind only)	/	Hz
Energy storage ports	Voltage (nominal or range)	/	d.c. V
	Nominal battery voltage	/	d.c. V
	Rated current (maximum continuous) input and output	/	d.c. A
	Storage type	/	
Other energy sources or inputs (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Power factor (range)	/	
	Frequency (nominal or range) (a.c. sources only)	/	Hz
a.c. output ratings (for each port)	Voltage (nominal or range)	230	a.c. V
	Rated current	17.4	a.c. A
	Current (inrush)	26.59	a.c. A (peak and duration)
	Frequency (nominal or range)	50	Hz
	Rated apparent power	4000	VA
	Power factor range	0.8 cap-0.8ind adjustable (defaut: 1)	
	Maximum output fault current	37.6	a.c. A (peak and duration)
	Maximum output overcurrent protection	22	a.c. A
d.c. output ratings	Voltage (nominal or range)	/	d.c. V
	Rated current	/	d.c. A
	Inverter topology	Non-isolated	
	Active anti-islanding method	ROCOF	
	Protective class (I, II or III)	I	
	Over voltage category	PV: OVC II, AC: OVC III	
	Ingress protection (IP) rating	IP65	
	Temperature operating range	-25-60° C	

NOTE: Table 16 is based on the requirements of IEC 62109-2.

EA5KSI:

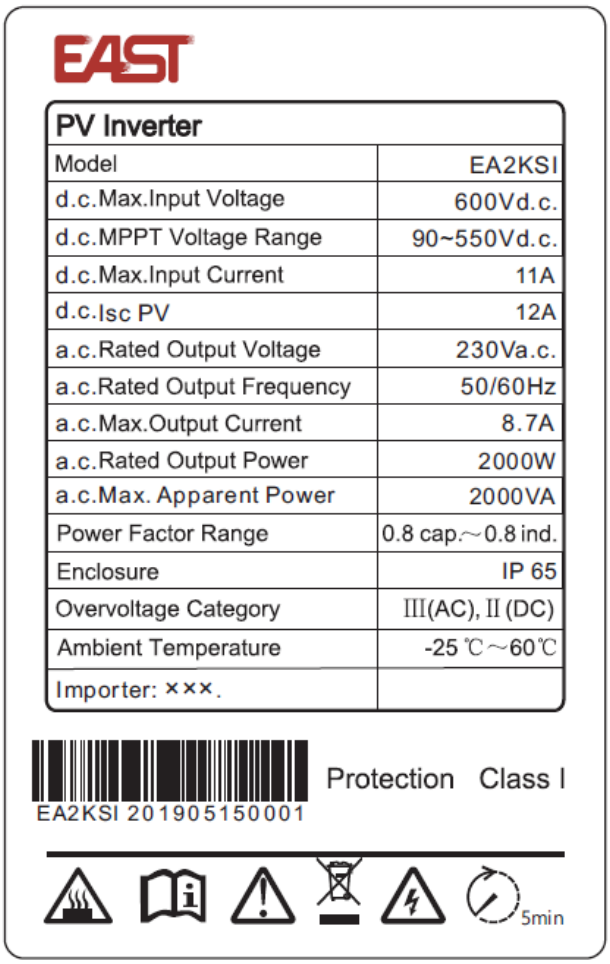
EA5KSI

INVERTER RATINGS DOCUMENTATION REQUIREMENTS

Port (all that apply)	Parameter	Value	Units
Photovoltaic	Vmax PV (absolute maximum)	600	d.c. V
	PV input operating voltage range	90-550	d.c. V
	Maximum operating PV input current	11*2	d.c. A
	Isc PV (absolute maximum)	12*2	d.c. A
	Maximum inverter backfeed current to array	0	a.c. A or d.c. A
Wind (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Current (inrush)	/	a.c. A or d.c. A (peak and duration)
	Frequency (nominal or range) (a.c. wind only)	/	Hz
Energy storage ports	Voltage (nominal or range)	/	d.c. V
	Nominal battery voltage	/	d.c. V
	Rated current (maximum continuous) input and output	/	d.c. A
	Storage type	/	
Other energy sources or inputs (a.c. or d.c.)	Voltage (nominal or range)	/	a.c. V or d.c. V
	Rated current (maximum continuous)	/	a.c. A or d.c. A
	Power factor (range)	/	
	Frequency (nominal or range) (a.c. sources only)	/	Hz
a.c. output ratings (for each port)	Voltage (nominal or range)	230	a.c. V
	Rated current	21.3	a.c. A
	Current (inrush)	32.74	a.c. A (peak and duration)
	Frequency (nominal or range)	50	Hz
	Rated apparent power	4900	VA
	Power factor range	0.8 cap-0.8ind adjustable (default 1)	
	Maximum output fault current	47	a.c. A (peak and duration)
	Maximum output overcurrent protection	28	a.c. A
d.c. output ratings	Voltage (nominal or range)	/	d.c. V
	Rated current	/	d.c. A
	Inverter topology	Non-isolated	
	Active anti-islanding method	ROCOF	
	Protective class (I, II or III)	I	
	Over voltage category	PV: OVC II, AC: OVC III	
	Ingress protection (IP) rating	IP65	
	Temperature operating range	-25-60° C	

NOTE: Table 16 is based on the requirements of IEC 62109-2.

Appnedix 2: Marking plate

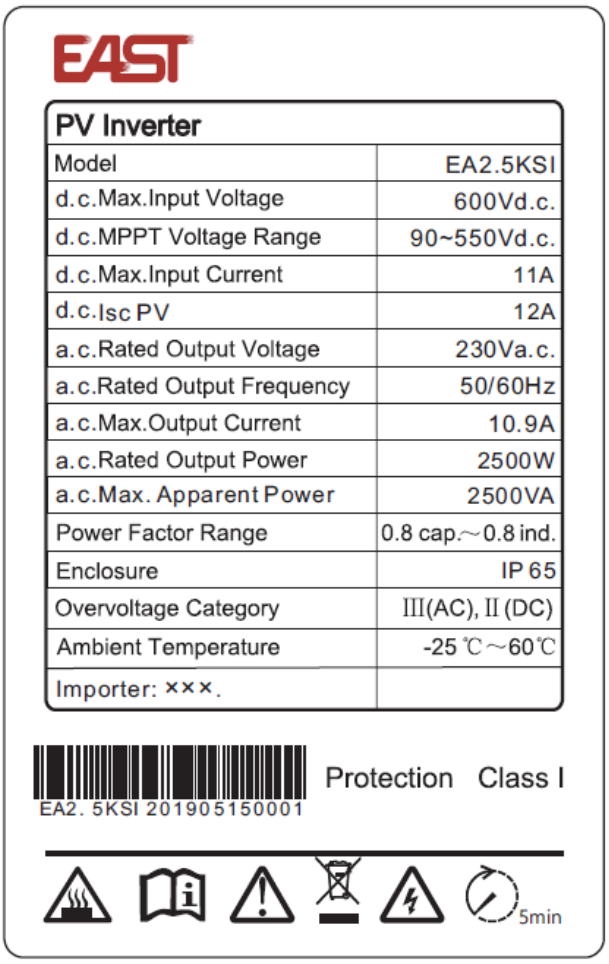


PV Inverter	
Model	EA2KSI
d.c.Max.Input Voltage	600Vd.c.
d.c.MPPT Voltage Range	90~550Vd.c.
d.c.Max.Input Current	11A
d.c.Isc PV	12A
a.c.Rated Output Voltage	230Va.c.
a.c.Rated Output Frequency	50/60Hz
a.c.Max.Output Current	8.7A
a.c.Rated Output Power	2000W
a.c.Max. Apparent Power	2000VA
Power Factor Range	0.8 cap.~0.8 ind.
Enclosure	IP 65
Overvoltage Category	III(AC), II (DC)
Ambient Temperature	-25℃~60℃
Importer: ×××.	

EA2KSI 201905150001

Protection Class I

5min

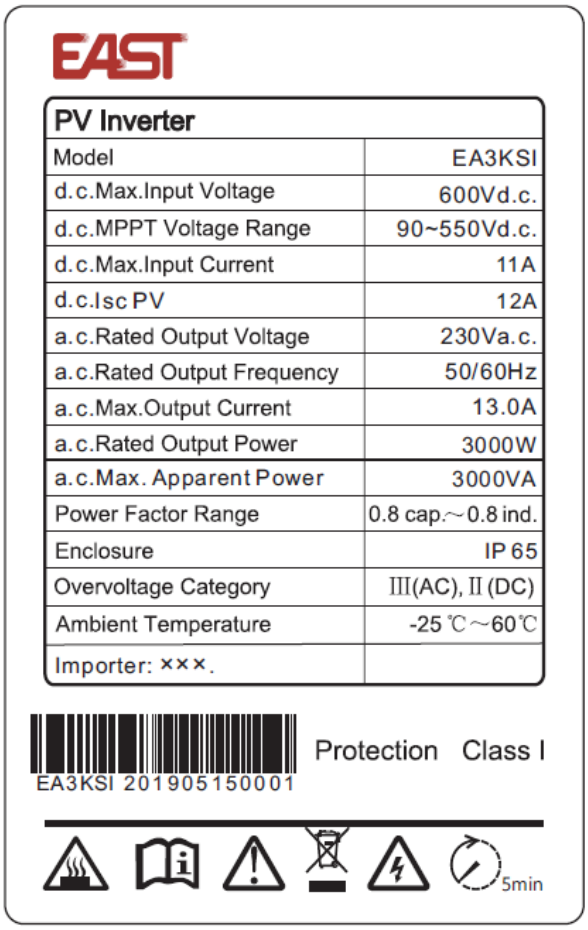


PV Inverter	
Model	EA2.5KSI
d.c.Max.Input Voltage	600Vd.c.
d.c.MPPT Voltage Range	90~550Vd.c.
d.c.Max.Input Current	11A
d.c.Isc PV	12A
a.c.Rated Output Voltage	230Va.c.
a.c.Rated Output Frequency	50/60Hz
a.c.Max.Output Current	10.9A
a.c.Rated Output Power	2500W
a.c.Max. Apparent Power	2500VA
Power Factor Range	0.8 cap.~0.8 ind.
Enclosure	IP 65
Overvoltage Category	III(AC), II (DC)
Ambient Temperature	-25℃~60℃
Importer: ×××.	

EA2. 5KSI 201905150001

Protection Class I

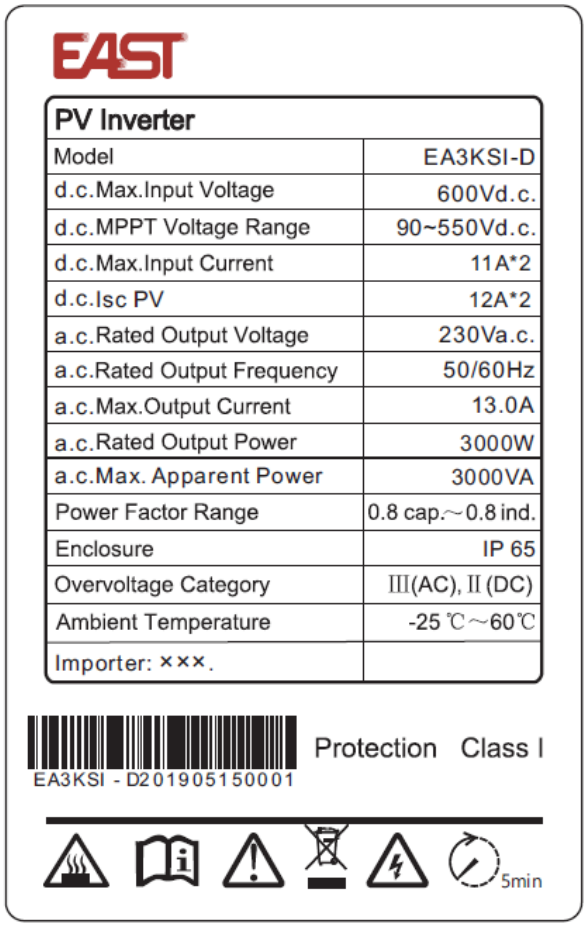
5min



PV Inverter	
Model	EA3KSI
d.c.Max.Input Voltage	600Vd.c.
d.c.MPPT Voltage Range	90~550Vd.c.
d.c.Max.Input Current	11A
d.c.Isc PV	12A
a.c.Rated Output Voltage	230Va.c.
a.c.Rated Output Frequency	50/60Hz
a.c.Max.Output Current	13.0A
a.c.Rated Output Power	3000W
a.c.Max. Apparent Power	3000VA
Power Factor Range	0.8 cap.~0.8 ind.
Enclosure	IP 65
Overvoltage Category	Ⅲ(AC), Ⅱ (DC)
Ambient Temperature	-25 ℃~60℃
Importer: ×××.	

EA3KSI 201905150001 Protection Class I

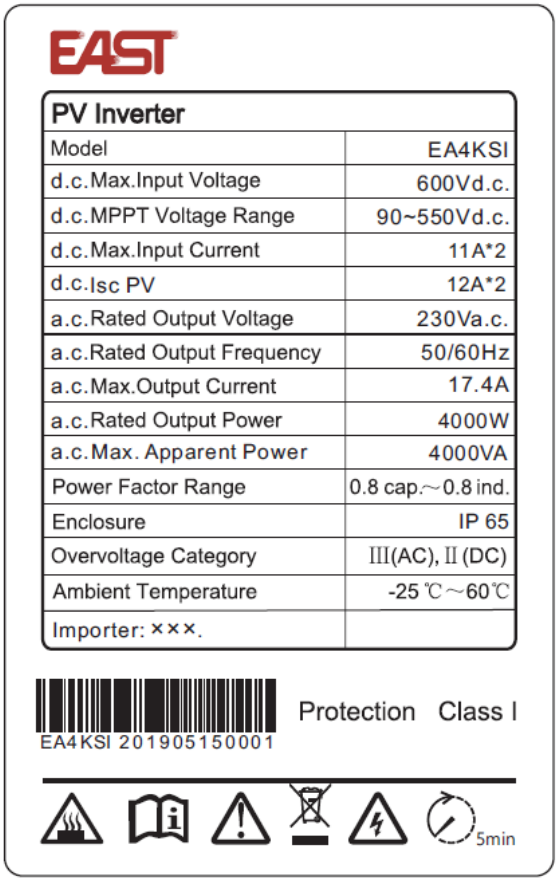
5min



PV Inverter	
Model	EA3KSI-D
d.c.Max.Input Voltage	600Vd.c.
d.c.MPPT Voltage Range	90~550Vd.c.
d.c.Max.Input Current	11A*2
d.c.Isc PV	12A*2
a.c.Rated Output Voltage	230Va.c.
a.c.Rated Output Frequency	50/60Hz
a.c.Max.Output Current	13.0A
a.c.Rated Output Power	3000W
a.c.Max. Apparent Power	3000VA
Power Factor Range	0.8 cap.~0.8 ind.
Enclosure	IP 65
Overvoltage Category	Ⅲ(AC), Ⅱ (DC)
Ambient Temperature	-25 ℃~60℃
Importer: ×××.	

EA3KSI - D201905150001 Protection Class I

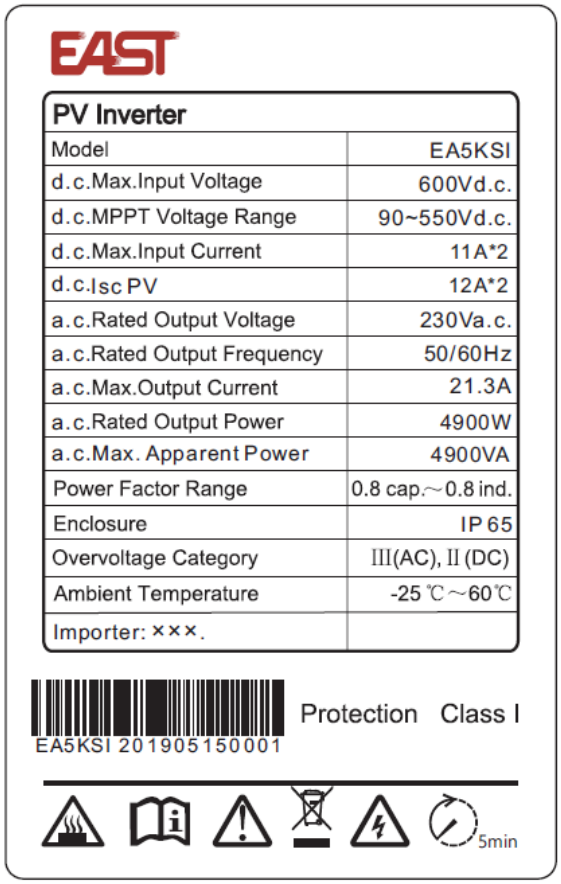
5min



PV Inverter	
Model	EA4KSI
d.c.Max.Input Voltage	600Vd.c.
d.c.MPPT Voltage Range	90~550Vd.c.
d.c.Max.Input Current	11A*2
d.c.Isc PV	12A*2
a.c.Rated Output Voltage	230Va.c.
a.c.Rated Output Frequency	50/60Hz
a.c.Max.Output Current	17.4A
a.c.Rated Output Power	4000W
a.c.Max. Apparent Power	4000VA
Power Factor Range	0.8 cap.~0.8 ind.
Enclosure	IP 65
Overvoltage Category	III(AC), II (DC)
Ambient Temperature	-25℃~60℃
Importer: ×××.	

EA4KSI 201905150001 Protection Class I

5min



PV Inverter	
Model	EA5KSI
d.c.Max.Input Voltage	600Vd.c.
d.c.MPPT Voltage Range	90~550Vd.c.
d.c.Max.Input Current	11A*2
d.c.Isc PV	12A*2
a.c.Rated Output Voltage	230Va.c.
a.c.Rated Output Frequency	50/60Hz
a.c.Max.Output Current	21.3A
a.c.Rated Output Power	4900W
a.c.Max. Apparent Power	4900VA
Power Factor Range	0.8 cap.~0.8 ind.
Enclosure	IP 65
Overvoltage Category	III(AC), II (DC)
Ambient Temperature	-25℃~60℃
Importer: ×××.	

EA5KSI 201905150001 Protection Class I

5min

Appendix 3: **Table 16 Clause 9.3.2 – Inverter ratings – Documentation requirements**

EA2KSI:		
Rating:	**Values**	**Units**
PV input quantities:		
Vmax PVa (absolute maximum)	600	V d.c.
PV input operating voltage range	90-550	V d.c.
Maximum operating PV input current	11	A d.c.
Isc PV[a] (absolute maximum)	12	A d.c.
Max. inverter backfeed current to the array	0	A d.c. or a.c.
a.c. output quantities:		
Voltage (nominal or range)	230	V a.c.
Current (maximum continuous) a.c. A	8.7	A a.c.
Current (inrush) peak and duration	14.3	A a.c.
Frequency (nominal or range)	50	Hz
Power (maximum continuous)	2000	VA
Power factor range	0.8LD to 0.8LG	
Maximum output fault current a.c. A	18.8	A a.c. (peak and duration), or RMS[b]
Maximum output overcurrent protection a.c. A	13.47	A a.c.
a.c. input quantities:		
Voltage (nominal or range) a.c. V	N/A	V a.c.
Current (maximum continuous) a.c. A	N/A	A a.c.
Power factor range	N/A	
Frequency (nominal or range) Hz	N/A	Hz
d.c. input (other than PV) quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c.
Nominal battery voltage d.c. V	N/A	V d.c.
Current (maximum continuous) d.c. A	N/A	A d.c.
d.c. output quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c
Nominal battery voltage d.c. V	N/A	V d.c
Current (maximum continuous) d.c. A	N/A	A d.c.
Protective classa (I, II, or III)	I	
Ingress protectiona (IP) rating per IEC 62109-1	IP65	
Firmware version	Control board: V009, Display board: V009	
[a] These terms are defined in section 3 of IEC 62109-2		
[b] The output short circuit test section in IEC 62019-1 specifies the type of measurement and the required units for this rating		

EA2.5KSI:		
Rating:	**Values**	**Units**
PV input quantities:		
Vmax PVa (absolute maximum)	600	V d.c.
PV input operating voltage range	90-550	V d.c.
Maximum operating PV input current	11	A d.c.
Isc PV[a] (absolute maximum)	12	A d.c.
Max. inverter backfeed current to the array	0	A d.c. or a.c.
a.c. output quantities:		
Voltage (nominal or range)	230	V a.c.
Current (maximum continuous) a.c. A	10.9	A a.c.
Current (inrush) peak and duration	17.37	A a.c.
Frequency (nominal or range)	50	Hz
Power (maximum continuous)	2500	VA
Power factor range	0.8LD to 0.8LG	
Maximum output fault current a.c. A	23.5	A a.c. (peak and duration), or RMS[b]
Maximum output overcurrent protection a.c. A	17	A a.c.
a.c. input quantities:		
Voltage (nominal or range) a.c. V	N/A	V a.c.
Current (maximum continuous) a.c. A	N/A	A a.c.
Power factor range	N/A	
Frequency (nominal or range) Hz	N/A	Hz
d.c. input (other than PV) quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c.
Nominal battery voltage d.c. V	N/A	V d.c.
Current (maximum continuous) d.c. A	N/A	A d.c.
d.c. output quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c
Nominal battery voltage d.c. V	N/A	V d.c
Current (maximum continuous) d.c. A	N/A	A d.c.
Protective classa (I, II, or III)	I	
Ingress protectiona (IP) rating per IEC 62109-1	IP65	
Firmware version	Control board: V009, Display board: V009	
[a] These terms are defined in section 3 of IEC 62109-2		
[b] The output short circuit test section in IEC 62019-1 specifies the type of measurement and the required units for this rating		

EA3KSI:		
Rating:	**Values**	**Units**
PV input quantities:		
Vmax PVa (absolute maximum)	600	V d.c.
PV input operating voltage range	90-550	V d.c.
Maximum operating PV input current	11	A d.c.
Isc PV[a] (absolute maximum)	12	A d.c.
Max. inverter backfeed current to the array	0	A d.c. or a.c.
a.c. output quantities:		
Voltage (nominal or range)	230	V a.c.
Current (maximum continuous) a.c. A	13	A a.c.
Current (inrush) peak and duration	20.44	A a.c.
Frequency (nominal or range)	50	Hz
Power (maximum continuous)	3000	VA
Power factor range	0.8LD to 0.8LG	
Maximum output fault current a.c. A	28.2	A a.c. (peak and duration), or RMS[b]
Maximum output overcurrent protection a.c. A	17.73	A a.c.
a.c. input quantities:		
Voltage (nominal or range) a.c. V	N/A	V a.c.
Current (maximum continuous) a.c. A	N/A	A a.c.
Power factor range	N/A	
Frequency (nominal or range) Hz	N/A	Hz
d.c. input (other than PV) quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c.
Nominal battery voltage d.c. V	N/A	V d.c.
Current (maximum continuous) d.c. A	N/A	A d.c.
d.c. output quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c
Nominal battery voltage d.c. V	N/A	V d.c
Current (maximum continuous) d.c. A	N/A	A d.c.
Protective classa (I, II, or III)	I	
Ingress protectiona (IP) rating per IEC 62109-1	IP65	
Firmware version	Control board: V009, Display board: V009	
[a] These terms are defined in section 3 of IEC 62109-2		
[b] The output short circuit test section in IEC 62019-1 specifies the type of measurement and the required units for this rating		

EA3KSI-D:		
Rating:	**Values**	**Units**
PV input quantities:		
Vmax PVa (absolute maximum)	600	V d.c.
PV input operating voltage range	90-550	V d.c.
Maximum operating PV input current	11*2	A d.c.
Isc PV[a] (absolute maximum)	12*2	A d.c.
Max. inverter backfeed current to the array	600	A d.c. or a.c.
a.c. output quantities:		
Voltage (nominal or range)	230	V a.c.
Current (maximum continuous) a.c. A	13	A a.c.
Current (inrush) peak and duration	20.44	A a.c.
Frequency (nominal or range)	50	Hz
Power (maximum continuous)	3000	VA
Power factor range	0.8LD to 0.8LG	
Maximum output fault current a.c. A	28.2	A a.c. (peak and duration), or RMS[b]
Maximum output overcurrent protection a.c. A	17	A a.c.
a.c. input quantities:		
Voltage (nominal or range) a.c. V	N/A	V a.c.
Current (maximum continuous) a.c. A	N/A	A a.c.
Power factor range	N/A	
Frequency (nominal or range) Hz	N/A	Hz
d.c. input (other than PV) quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c.
Nominal battery voltage d.c. V	N/A	V d.c.
Current (maximum continuous) d.c. A	N/A	A d.c.
d.c. output quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c
Nominal battery voltage d.c. V	N/A	V d.c
Current (maximum continuous) d.c. A	N/A	A d.c.
Protective classa (I, II, or III)	I	
Ingress protectiona (IP) rating per IEC 62109-1	IP65	
Firmware version	Control board: V009, Display board: V009	
[a] These terms are defined in section 3 of IEC 62109-2		
[b] The output short circuit test section in IEC 62019-1 specifies the type of measurement and the required units for this rating		

EA4KSI:		
Rating:	**Values**	**Units**
PV input quantities:		
Vmax PVa (absolute maximum)	600	V d.c.
PV input operating voltage range	90-550	V d.c.
Maximum operating PV input current	11*2	A d.c.
Isc PV[a] (absolute maximum)	12*2	A d.c.
Max. inverter backfeed current to the array	600	A d.c. or a.c.
a.c. output quantities:		
Voltage (nominal or range)	230	V a.c.
Current (maximum continuous) a.c. A	17.4	A a.c.
Current (inrush) peak and duration	26.59	A a.c.
Frequency (nominal or range)	50	Hz
Power (maximum continuous)	4000	VA
Power factor range	0.8LD to 0.8LG	
Maximum output fault current a.c. A	37.6	A a.c. (peak and duration), or RMS[b]
Maximum output overcurrent protection a.c. A	22	A a.c.
a.c. input quantities:		
Voltage (nominal or range) a.c. V	N/A	V a.c.
Current (maximum continuous) a.c. A	N/A	A a.c.
Power factor range	N/A	
Frequency (nominal or range) Hz	N/A	Hz
d.c. input (other than PV) quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c.
Nominal battery voltage d.c. V	N/A	V d.c.
Current (maximum continuous) d.c. A	N/A	A d.c.
d.c. output quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c
Nominal battery voltage d.c. V	N/A	V d.c
Current (maximum continuous) d.c. A	N/A	A d.c.
Protective classa (I, II, or III)	I	
Ingress protectiona (IP) rating per IEC 62109-1	IP65	
Firmware version	Control board: V009, Display board: V009	
[a] These terms are defined in section 3 of IEC 62109-2		
[b] The output short circuit test section in IEC 62019-1 specifies the type of measurement and the required units for this rating		

EA5KSI:		
Rating:	**Values**	**Units**
PV input quantities:		
Vmax PVa (absolute maximum)	600	V d.c.
PV input operating voltage range	90-550	V d.c.
Maximum operating PV input current	11*2	A d.c.
Isc PV[a] (absolute maximum)	12*2	A d.c.
Max. inverter backfeed current to the array	0	A d.c. or a.c.
a.c. output quantities:		
Voltage (nominal or range)	230	V a.c.
Current (maximum continuous) a.c. A	21.3	A a.c.
Current (inrush) peak and duration	32.74	A a.c.
Frequency (nominal or range)	50	Hz
Power (maximum continuous)	4900	VA
Power factor range	0.8LD to 0.8LG	
Maximum output fault current a.c. A	47	A a.c. (peak and duration), or RMS[b]
Maximum output overcurrent protection a.c. A	28	A a.c.
a.c. input quantities:		
Voltage (nominal or range) a.c. V	N/A	V a.c.
Current (maximum continuous) a.c. A	N/A	A a.c.
Power factor range	N/A	
Frequency (nominal or range) Hz	N/A	Hz
d.c. input (other than PV) quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c.
Nominal battery voltage d.c. V	N/A	V d.c.
Current (maximum continuous) d.c. A	N/A	A d.c.
d.c. output quantities:		
Voltage (nominal or range) d.c. V	N/A	V d.c
Nominal battery voltage d.c. V	N/A	V d.c
Current (maximum continuous) d.c. A	N/A	A d.c.
Protective classa (I, II, or III)	I	
Ingress protectiona (IP) rating per IEC 62109-1	IP65	
Firmware version	Control board: V009, Display board: V009	
[a] These terms are defined in section 3 of IEC 62109-2		
[b] The output short circuit test section in IEC 62019-1 specifies the type of measurement and the required units for this rating		

-End of report-