

Network Standard

NETWORK

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ES3 METERING INSTALLATION REQUIREMENTS PART A



ISSUE

For issue to all Ausgrid and Accredited Service Providers' staff involved with the installation of metering equipment and is for reference by field, technical and engineering staff.

Ausgrid maintains a copy of this and other Network Standards together with updates and amendments on www.ausgrid.com.au.

Where this standard is issued as a controlled document replacing an earlier edition, remove and destroy the superseded document.

DISCLAIMER

As Ausgrid's standards are subject to ongoing review, the information contained in this document may be amended by Ausgrid at any time. It is possible that conflict may exist between standard documents. In this event, the most recent standard shall prevail.

This document has been developed using information available from field and other sources and is suitable for most situations encountered in Ausgrid. Particular conditions, projects or localities may require special or different practices. It is the responsibility of the local manager, supervisor, assured quality contractor and the individuals involved to make sure that a safe system of work is employed and that statutory requirements are met.

Ausgrid disclaims any and all liability to any person or persons for any procedure, process or any other thing done or not done, as a result of this Standard.

All design work, and the associated supply of materials and equipment, must be undertaken in accordance with and consideration of relevant legislative and regulatory requirements, latest revision of Ausgrid's Network Standards and specifications and Australian Standards. Designs submitted shall be declared as fit for purpose. Where the designer wishes to include a variation to a network standard or an alternative material or equipment to that currently approved the designer must obtain authorisation from the Network Standard owner before incorporating a variation to a Network Standard in a design.

External designers including those authorised as Accredited Service Providers will seek approval through the approved process as outlined in NS181 Approval of Materials and Equipment and Network Standard Variations. Seeking approval will ensure Network Standards are appropriately updated and that a consistent interpretation of the legislative framework is employed.

Notes: 1. Compliance with this Network Standard does not automatically satisfy the requirements of a Designer Safety Report. The designer must comply with the provisions of the Workplace Health and Safety Regulation 2011 (NSW - Part 6.2 Duties of designer of structure and person who commissions construction work) which requires the designer to provide a written safety report to the person who commissioned the design. This report must be provided to Ausgrid in all instances, including where the design was commissioned by or on behalf of a person who proposes to connect premises to Ausgrid's network, and will form part of the Designer Safety Report which must also be presented to Ausgrid. Further information is provided in Network Standard (NS) 212 Integrated Support Requirements for Ausgrid Network Assets.

2. Where the procedural requirements of this document conflict with contestable project procedures, the contestable project procedures shall take precedent for the whole project or part thereof which is classified as contestable. Any external contact with Ausgrid for contestable works projects is to be made via the Ausgrid officer responsible for facilitating the contestable project. The Contestable Ausgrid officer will liaise with Ausgrid internal departments and specialists as necessary to fulfil the requirements of this standard. All other technical aspects of this document which are not procedural in nature shall apply to contestable works projects.

INTERPRETATION

In the event that any user of this Standard considers that any of its provisions is uncertain, ambiguous or otherwise in need of interpretation, the user should request Ausgrid to clarify the provision. Ausgrid's interpretation shall then apply as though it was included in the Standard, and is final and binding. No correspondence will be entered into with any person disputing the meaning of the provision published in the Standard or the accuracy of Ausgrid's interpretation.

KEYPOINTS

This standard has a summary of content labelled "KEYPOINTS FOR THIS STANDARD". The inclusion or omission of items in this summary does not signify any specific importance or criticality to the items described. It is meant to simply provide the reader with a quick assessment of some of the major issues addressed by the standard. To fully appreciate the content and the requirements of the standard it must be read in its entirety.

AMENDMENTS TO THIS STANDARD

Where there are changes to this standard from the previously approved version, any previous shading is removed and the newly affected paragraphs are shaded with a grey background. Where the document changes exceed 25% of the document content, any grey background in the document is to be removed and the following words should be shown below the title block on the right hand side of the page in bold and italic, for example, *Supersedes – document details (for example, "Supersedes Document Type (Category) Document No. Amendment No.")*.

KEY POINTS OF THIS STANDARD

Scope and Risks Addressed

Metering Requirements

Metering Installation

Contestable Metering

This standard is limited to scope identified below and provides controls for associated risks as listed below:

- CT metering
- HV metering
- Metering requirements for consumers
- Energising metering
- Connection policy

Use this section to identify/summarise major design requirements:

- Physical metering requirements
- Commercial and residential tariffs

Construction requirements may include references to safety and construction management processes:

- Commercial installations
- Domestic installations
- Existing installations

Design and policy requirements

- Contestable Type 1-4 metering installations
- Meter Returns

Where to for more information?
Section 6, 8, 9

Where to for more information?
Section 6,8,9

Where to for more information?
Section 7, 10

Where to for more information?
Section 8, 9

Tools and Forms
NA

Tools and Forms
NA

Tools and Forms
N/A

Network Standard S0141 ES3 Metering Installation Requirements Part A

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1 PURPOSE

This publication provides general information to assist with connection of metering equipment to Ausgrid's network. This publication will be enforceable from 1 August 2018.

2 SCOPE

This document outlines Ausgrid's revenue metering installation requirements for all metered installations within the Ausgrid distribution area. The metering installation must also comply with the following requirements where applicable:

- The National Electricity Rules
- AEMO Metrology Procedure
- AEMO Service Level Procedures for MPB's and other associated AEMO procedures
- Ausgrid's Electrical Supply (ES) series of documents
- Ausgrid's Connection Policy, Connection Charges
- The customers connection contract with Ausgrid (under NECF)
- Deemed Standard Connection Contract
- Service and Installation Rules of NSW
- Ausgrid's Network Standard (NS) series of documents
- AS/NZS3000, The Wiring Rules
- Code for safe installation of direct-connected whole current electricity metering in NSW

3 REFERENCES

3.1 General

All work covered in this document shall conform to all relevant Legislation, Standards, Codes of Practice and Network Standards. Current Network Standards are available on Ausgrid's Internet site at www.ausgrid.com.au.

3.2 Ausgrid documents

- Company Form (Governance) - Network Technical Document Endorsement and Approval
- Company Procedure (Governance) - Network Technical Document Endorsement and Approval
- Company Procedure (Network) – Network Standards Compliance
- Company Procedure (Network) - Production / Review of Engineering Technical Documents within BMS
- Customer Installation Safety Plan
- Division Workplace Instruction (Network) – Production /review of Network Standards
- Electrical Safety Rules
- Electricity Network Safety Management System Manual
- NS181 Approval of Materials and Equipment and Network Standard Variations
- NS212 Integrated Support Requirements for Ausgrid Network Assets
- NS261 Requirement for Design Compliance Framework for Network Standards

3.3 Other standards and documents

- ENA Doc 001-2008 National Electricity Network Safety Code

3.4 Acts and regulations

- Electricity Supply (General) Regulation 2014 (NSW)
- Electricity Supply (Safety and Network Management) Regulation 2014
- Work Health and Safety Act 2011 and Regulation 2011

4 DEFINITIONS

Accredited Service Provider (ASP)	An individual or entity accredited by the NSW Department of Industry, Division of Planning and Environment, in accordance with the Electricity Supply (Safety and Network Management) Regulation 2014 (NSW).
AEMO	Australian Energy Market Operator.
BASIC Meter	A meter used in a Flat Rate Metering Installation.
Bi Directional Metering	ToU electronic metering that is capable of measuring both energy consumption (Import) and energy generated back into the electricity network (export)
Business Management System (BMS)	An Ausgrid internal integrated policy and procedure framework that contains the approved version of documents.
Business to Business (B2B)	Business communication tool managed by AEMO for participants operating in the National Electricity Market.
CCEW	Certificate of Compliance – Electrical Work
CEC	Clean Energy Council. Formerly the Business Council of Sustainable Energy.
Connection Application	Connection Application. See Ausgrid’s website for details https://www.ausgrid.com.au/Common/Custom er-Services/Business-and-commercial/Connecting-to-the-network/How-do-I-connect-to-the-network/Application-forms-and-guides.aspx
Connection Point	Means the junction between the customer’s installation and the electricity network. Known as point of common coupling as per the Service and Installation rules of NSW. See the Service and Installation Rules of NSW for examples.
CT	Current Transformer
Customer Installation	For the purpose of this document, a Customer Installation is the whole or portion of a customer’s private electrical installation that requires separate metering and an individual National Metering Identifier (NMI) for the purposes of the National Electricity Market (NEM). For example a block of 20 home units or flats will have at least 20 Customer Installations and possibly one or more common Customer Installations such as house lights, lifts and essential services.
Data Stream	Data Stream means a stream of energy data or metering data associated with a metering point, as represented by a NMI. For example, a NMI will have multiple Data Streams where one or more meters or one or more channels or registers comprise a single meter. Each Data Stream is identified by a suffix, which is associated with the NMI to which it belongs.
Document control	As a minimum requirement, controlled documents will be identified by a unique number, be signed or noted as approved by the appropriate approving officer, have the current amendment number and approval date clearly displayed.
	Note: Ausgrid employees who work with printed copies of document must check the Business Management System (BMS) regularly to monitor version control. Documents are considered “uncontrolled if printed”, as indicated in the footer.
Export Energy	Electricity that is generated by the customer and delivered back to the Ausgrid Network (i.e. electricity delivered to the NEM electricity pool).

Flat Rate Metering	A Type 6, accumulation or Basic metering installation.
Gross Metering	A metering system that measures the electricity generated by the Complying Generator system.
ILAC	The International Laboratory Accreditation Corporation.
Import Energy	Electricity that is drawn from the local distribution network and consumed or used within the customer's installation (i.e. electricity received from the NEM electricity pool).
Load Control Unit (LCU)	Load Control Unit means ripple frequency relay or a time switch that controls specific customer load. Refer to ES7 – Network Price Guide for further information on controlled load tariffs.
Meter Maintenance	Means the replacement, relocation or repair of any metering equipment as deemed necessary by the appointed Metering Provider. Meter Maintenance on electricity meters may only be conducted by the appointed AEMO Metering Provider.
MRIM	Manually Read Interval Meter - a meter used in a ToU Metering Installation.
MDP	Meter Data Provider - A service provider accredited by AEMO and responsible for the collection, validation, storage and distribution of electricity meter data.
MPA	Metering Provider A – A service provider accredited by the NSW Planning and Environment and Authorised by Ausgrid (i.e. Level 2, Category 4 ASP), who is responsible for the installation of NER compliant whole current connected metering for sites < 160MWh energy consumption per annum for a NEM Responsible Person (e.g. Ausgrid Local Network Service Provider).
MPB	Metering Provider B - A service provider accredited by AEMO and responsible for electricity meter supply, installation, maintenance, testing and repair of a metering installation.
MSATS	Market Settlement and Transfer Solution managed by AEMO.
NEM	National Electricity Market.
NER	National Electricity Rules.
Net Metering	A metering system that measures the excess energy generated and exported into the distribution network.
Non-compliant	For the purposes of this document this means an embedded generation system that does not meet the requirements of the NSW Solar Bonus Scheme
NMI	National Metering Identifier.
NSW Trade and Investment	The Department of Trade and Investment, Regional Infrastructure and Services (NSW) who manage the accreditation scheme for contestable works within NSW.
NOSW	Notification of Service Work (Ausgrid). See ES4 for further details.
Network Standard	A document, including Network Planning Standards, that describes Ausgrid's minimum requirements for planning, design, construction, maintenance, technical specification, environmental, property and metering activities on the distribution and transmission network. These documents are stored in the Network Category of the BMS repository.

Recordkeeping	Making and maintaining complete, accurate and reliable evidence of business transactions in the form of recorded information (Source: AS Records classification handbook – HB5031 – 2011).
Metering Coordinator	The person who has responsibility for a metering installation for a particular Connection Point, as described in Chapter 7 of the NERs.
Review date	The review date displayed in the header of the document is the future date for review of a document which is one year for documents requiring annual review, two years for fraud control documents or the default period of three years from the date of approval. A review may be mandated at any time where a need is identified due to changes in legislation, organisational changes, restructures, occurrence of an incident or changes in technology or work practice
Rule Compliant	Rule Compliant is metering that complies with the requirements of the National Electricity Rules (Chapter 7) and associated procedures.
Small Retail Customer	A customer with an energy consumption of less than 160MWh's per annum.
Structure (Str)	Is the electronic meter's program configuration identifier which identifies the measurement parameters of the meter. Further details of meter structures for each Ausgrid owned meter can be found in ES3 Part B - Metering Equipment Technical Description for Type 5 & Type 6 Metering Installations.
Time of Use (ToU) metering	A Type 5, interval or MRIM metering installation.

5 PROVISION OF METERING EQUIPMENT

5.1 General

The customer is required to fund the cost of connection to the network, refer to Ausgrid’s Connection Policy – Connection Charges. The Customer’s maybe required to fund the cost of metering to allow connection to Ausgrid’s network. The customer should discuss any metering arrangements for new or altered installation with their ASP and electricity retailer.

Table 1 Provision of metering equipment

Customer Category	Phases	Connection	Network Tariff Arrangement (f)	Retail Customer Category (c)	Market Type	Metering Equipment			
						Supply	Installation	Ownership	Maintenance
Residential	1	WC	As per ES7	Small (d)	Type 4 Type 4A	Meter – MPB	MPB (b)		
	3								
Commercial	1								
	3								
Commercial	3	(LV) CT	As per ES7	Or Large (e)	Type 1-4	Meter – MPB	MPB (b)		
		CT – Customer				Customer	Customer	Customer / MPB (b)	
	3	HV		Meter – MPB		MPB (b)			
				CT – Customer		Customer (a)	Customer	Customer / MPB (b)	
				VT – Customer					

Provision of metering equipment table notes

- (a) The customer’s metering installation, including any associated current and voltage transformers, must be located within the customer’s installation and external to Ausgrid’s substation or equipment. Refer also to NS 195 HV Customer Connections (HVCs). Where the customer’s metering equipment was previously installed in Ausgrid’s substation (e.g. a HV metering unit), or embedded within Ausgrid’s switchgear (e.g. CTs and VTs), it must be relocated into the customer’s installation and external to Ausgrid’s equipment, at the customer’s cost, where this metering equipment or switchgear requires replacement or alterations for any reason
- (b) Metering installation, ownership and maintenance arrangements are commercially negotiated between a retailer and a customer
- (c) Retail customer category is as per the National Energy Retail Law (NSW) Section 1, subsection 5

- (d) A small customer is a customer (a) who is a residential customer; or (b) who is a business customer who consumes energy at business premises below the upper consumption threshold of 100MWh per annum.
- (e) A large customer is a business customer who consumes energy at business premises at or above the upper consumption threshold of 100MWh per annum.
- (f) Network tariff will be assigned as per ES7 Network Price Guide.

5.2 Notification requirements for new metered installations

For all new metering installations, the customer's agent must ensure a Retail contract is in place and then obtain an Installation Job Number from the local Ausgrid Field Operations office prior to installing metering and the site being energised. A completed 'Connection Application' must be submitted to Ausgrid to obtain the Installation job number. See our website <http://www.ausgrid.com.au/Common/Our-network/Connecting-to-the-network.aspx> for information on submitting connection applications.

For all new Type 1-4 metering installations, the MPB is responsible for coordinating with the customer's licensed electrical contractor and ASP (e.g. service line installer) to ensure that the new metering is commissioned at the time the customer takes supply and complies with all the requirements defined in Ausgrid document ES 1 – Premises Connection Requirements. Customer Installations must not be energised without an NER compliant Metering Installation installed.

The procedures detailed in Ausgrid publication ES 4 – Service Provider Authorisation must be followed for energising whole current installations. Mandatory inspections are required for sites greater than 100 Amps, see ES1 – Premises Connection Requirements for further details.

6 METERING REQUIREMENTS FOR SMALL RETAIL CUSTOMERS

6.1 Introduction

As of 1 December 2017 all new, upgraded or replacement metering must be a Type 1-4 Metering Installation. The installation of this metering must be arranged through the customer's electricity retailer.

Ausgrid is no longer accredited with AEMO as a Metering Provider and therefore cannot conduct meter maintenance. However, Ausgrid has an obligation under the NERs to appoint AEMO accredited service providers for the maintenance and reading of existing Flat Rate or ToU metering equipment connected at existing small Customer Installations located within the Ausgrid distribution network.

Meter maintenance is provided to Ausgrid under contract with an AEMO accredited metering provider and as at the publication date of this policy the appointed metering provider is Plus ES. Any enquires regarding meter maintenance should be directed to Plus ES.

6.2 Metering requirements

The metering point must be located as close as practicable to the Connection Point as defined in the Service and Installation Rules of NSW.

Unless prior approval has been granted by Ausgrid to permanently disconnect a premises connection from the Ausgrid Network, or it is an Ausgrid approved unmetered supply, all premises must have revenue metering as per this document and the NER and installed to capture energy usage and/or generation prior to being energised.

If metering equipment is removed, it must be returned as per clause 10 of this document.

Ausgrid's controlled load equipment (meters, LCUs etc) are rated for a maximum of 25 Amps resistive load at single phase. For any multi-phase controlled load connections, loads of greater than 25 Amps or reactive loads, the customer will be required to install a sealable contactor at their cost (see the Service and Installation Rules of NSW for additional information).

Any alterations to Ausgrid's load control equipment must continue to comply with the requirements outlined in this document. If the alterations exceed these requirements a new metering installation must be arranged by the customer's retailer.

6.2.1 Load control where Type 4 metering is installed

Where controlled load functionality is required and Type 4 metering is installed, it is the MPBs responsibility to arrange for suitable load control functionality. The load control switching must be incorporated within the MPBs meter, and the functionality must comply with appendix B of ES7 - Network Pricing Guide, unless an exemption is agreed between the MPB and Ausgrid.

Ausgrid LCUs must not be left onsite unless the LCU is controlling more than one customers controlled load (e.g. multi pole relay).

If the existing load control is switched by a Type 5 E2 meter, this must be returned to Ausgrid as outlined in Section 10, so that a final read may be conducted.

6.2.2 Customers that remove controlled load

6.2.2.1 General

Customers that no longer require controlled load (e.g. removal of a hot water system) must arrange for the removal of the redundant controlled load metering and LCU. If the load control equipment remains onsite, ongoing charges associated with the controlled load tariff will continue to be billed to the customer's retailer.

6.2.2.2 E2 meter for controlled load use

When an E2/E2c meter is used as the control mechanism for the controlled load circuits of a customer's installation, the precautions outlined in this clause must be adhered to.

Both elements of an E2/E2c meter must be utilised (i.e. primary and controlled load elements). Incorrect installation of these meters will result in a major defect being issued against the ASP, which will require immediate rectification.

A special exemption to this requirement is the use of the E2c programmed with Structure (Str) 66 or 67 where the first element has been disabled and the meter has been configured to operate as a single element meter with load control. Element 1 has been disabled and alarmed to monitor for inadvertent connection.

Controlled load circuits must not be connected through the main principal tariff element of the E2 meter.

- The un-switched terminal of the E2 meter can only be used for the following purposes;
- Existing dual element hot water systems utilising the un-switched terminal for the top element and the bottom element is supplied from the switched terminal; or
- For inductive loads, which must be connected via a customer supplied contactor as the per the Service and Installation Rules of NSW; or
- For loads greater than 25 Amps or multi-phase loads which must be connected via a customer supplied contactor as per the Service and Installation Rules of NSW.

With the exception of a Structure (Str) 26 gross meter, the uncontrolled terminal on an E2 meter can only be utilised where a controlled load tariff is applicable. Note both controlled and uncontrolled terminals are connected to the same metering element.

The total combined current limit of an E2 meter must not exceed 100 amps. If the intended load is greater than 100 amps, the local Field Operations Office must be consulted for approval of alternative metering arrangements.

Ausgrid may utilise the E2 meter to replace faulty relays, time switches and associated meters on existing Customer Installations. As the replacement of faulty Ausgrid supplied metering equipment is a monopoly service, ASPs are not permitted to carry out Metering Maintenance.

6.2.2.3 Load control unit (LCU)

Only one LCU is permitted per controlled load tariff for each separately metered Customer Installation. Controlled load circuits that have multi-phase loads, inductive loads or loads greater than 25 Amps must be connected via a customer supplied contactor as per the Service and Installation Rules of NSW.

6.2.3 Transferring meters from a builders service to the permanent installation

Existing Ausgrid ToU or Flat Rate whole current metering instruments installed for a single domestic builders service **cannot** be transferred to the permanent metering location for the same site or vice versa, without approval from the appointed AEMO Metering Provider. For Ausgrid owned ToU or Flat Rate metering this is currently Plus ES.

If an Advanced Type 4 meter is installed the ASP must contact the customer's retailers to discuss options to transfer metering.

A new NMI is not required if the point of common coupling is not changing.

6.2.4 Relocating existing meters

Existing Ausgrid ToU or Flat Rate whole current meters (or 'meter panels' with metering instruments in situ) **must not be** relocated to a new location (either on the same or a different meter panel) without approval from the appointed AEMO Metering Provider. For Ausgrid owned ToU or Flat Rate metering this is currently Plus ES.

If an Advanced Type 4 meter is installed the ASP must contact the customer's retailer to discuss options to transfer metering.

6.2.5 Rewiring of existing meters

Where cabling is required to be replaced at existing Ausgrid Tou or Flat Rate whole current meters, this must be conducted by an appropriately authorised ASP2. The ASP2 must submit a NOSW to Ausgrid within 2 days of completion of the works.

6.2.6 Emergency works where customers are off supply

6.2.6.1 General

In situations where customer's equipment has failed causing them to have limited or no power (eg. A pole failure, switchboard fire/damage) ASP2 may repair the customer's installation to restore electricity supply to the customer. These works qualify as Category 2D contestable works under the ASP scheme. The ASP must contact Ausgrid for a job number before commencing work. The following rules apply to any of these circumstances.

6.2.6.2 Where the metering is not damaged.

An ASP may reinstall the Ausgrid ToU or Flat Rate meter (regardless of nameplate rating) on a replacement switchboard and reenergise the customer's installation as per current Service and Installation Rules of NSW, AS/NZS3000, Ausgrid Electricity Supply Standards and any other relevant rules. Within 2 days of the completion of this work a NOSW and CCEW must be submitted to Ausgrid stating the works that have been completed clearly stating that existing Ausgrid metering has been reused and requires replacement by the retailer.

The ASP must clearly indicate on the NOSW and CCEW that category 2D contestable works have been conducted.

6.2.6.3 Where the metering is damaged or cannot be reinstalled.

An ASP may repair the defective customer installation as per current Service and Installation Rules of NSW, AS/NZS3000, Ausgrid Electricity Supply Standards and any other relevant rules. The ASP is not permitted to reenergise the customer's electrical installation without a NER compliant meter installed. When the ASP has tested the installation and ready for the installation to be reenergised, the ASP must contact the customer's electricity retailer to arrange for an emergency meter to be installed.

If the customer's retailer cannot provide a meter in a suitable period the ASP should request that the retailer contact Ausgrid and arrange for an Ausgrid officer to attend the site to reenergise, giving the customer unmetered supply. The ASP must leave a copy of the CCEW at the customer main switchboard otherwise Ausgrid will not reenergise the customer's installation. Within 2 days of the completion of this work a NOSW and CCEW must be submitted to Ausgrid stating the works that have been completed and identifying that existing Ausgrid metering has been damaged, Ausgrid has provided an unmetered supply and the retailer must arrange for a new meter to be installed.

The ASP must clearly indicate on the NOSW and CCEW that category 2D contestable works have been conducted.

6.2.6.4 Multiple Occupancy Premises.

Clauses 6.2.6.2 and 6.2.6.3 also apply where there is a loss of supply at a multiple occupancy premises. Within 2 days of the completion of this work a NOSW and CCEW for each effected customer installation, must be submitted to Ausgrid stating what works have been complete, which meters have been reinstalled or if unmetered supply has been provided by Ausgrid.

The ASP must clearly indicate on each NOSW and CCEW that category 2D contestable works have been conducted.

6.2.7 Permanent disconnection of a customer's installation

Where there is a request to permanently disconnect a Customer Installation from the Ausgrid network, the ASP must follow the procedures outlined in ES1 and on our website. Where a Type1-4 meter is installed, the ASP must contact the customer's current electricity retailer to arrange for the removal of the metering. A NOSW must be completed by the ASP2 within 2 days of completing the works for all removed Ausgrid **service** assets. The MPB must provide Ausgrid with a B2B NOMW confirming the removal of the metering before Ausgrid will update the NMI status to extinct in MSATS.

If Ausgrid ToU or Flat Rate metering is required to be removed, Ausgrid as the asset owner permits an appropriately authorised ASP2 to remove the metering. A NOSW must be completed by the ASP2 within 2 days of completing the works for all removed Ausgrid assets. Upon completion of the works, ASPs must return Ausgrid ToU or Flat Rate meters to Ausgrid in accordance with clause 10.

6.2.8 Flexible switchboard and panel wiring

Flexible switchboard and panel wiring such as “Triangle’s PVC Flexible V90 HT Panel Wires and Switchboard Cable” may be used to connect service and metering equipment, provided it is installed in accordance with the manufacturer’s specifications. In particular, the exposed bare stranded conductors must be terminated into an approved (by the flexible cable manufacturer) encapsulation device, such as a Bootlace Pin (BLP) that must be crimped with an approved (by the encapsulation device manufacturer) crimping tool, before the cable is connected to service and metering equipment.

The (thin-walled) metallic portion of the encapsulation device (BLP) must be of adequate length to ensure effective connection under ALL termination screws of the service and metering equipment.

6.3 Application of tariffs

6.3.1 General

An appropriate Network tariff will be applied to all installed metering in accordance with the requirements documented in Ausgrid publication ES7 – Network Price Guide and the Ausgrid Network Price List.

The customer’s energy Retailer will advise the customer of the current applicable retail tariff arrangements.

6.3.2 Reading of flat rate metering equipment

Ausgrid’s Flat Rate metering equipment display the total energy in kWh consumed by the installation, accumulated from the date the meter is installed

6.3.3 Reading of time of use metering equipment

Ausgrid programs all ToU metering equipment with a standard display configuration that may automatically or manually cycle (by pressing the display button on the meter) through a pre-set formatted display. Each of these displays has a specific function (e.g. date/time, kWh’s) and a register identifier.

If a customer wishes to read the display of their electronic meter, they should look at the display readings on the meter and match them to Table 2 (below) using the register (ID) identifiers as reference.

Note: The meter time is not adjusted for daylight saving but is corrected in preparing meter data for other purposes such as billing.

In general a subset of the following information in Table 2 is displayed on the registers indicated, based on the Type of meter and structure.

Table 2 Description of register displays for electronic metering

Registers		Structures									Description	Example
ID	Function	19 60	20 62 63	21 61	23 64 65	66 67	25	26	27	29		
88	Display Test	✓	✓	✓	✓	✓	✓	✓	✓	✓	Default display. Represents the start of the scroll	All LCD symbols
1	Date	✓	✓	✓	✓	✓	✓	✓	✓	✓	Current date programmed in meter	29:04:10
2	Time	✓	✓	✓	✓	✓	✓	✓	✓	✓	Current time programmed in meter. (Time is not adjusted for daylight saving)	12:34:23
3	kWh Import	✓	✓	✓	✓			✓		✓	Total energy consumed by the installation, accumulated from the date the meter is installed	3245.7
7	kWh Controlled		✓		✓	✓				✓	Total energy consumed by the controlled load (off peak) portion of the installation, accumulated from the date the meter is installed	12568.3
73	Gross kWh Export						✓	✓	✓	✓	Total energy produced by the Complying Generator, accumulated from the date the meter is installed.	1025.6
83	Gross kWh Import						✓	✓	✓	✓	Total energy consumed by the Complying Generator, accumulated from the date the meter is installed.	12548.5
93	Net kWh Export			✓	✓					✓	The excess energy not consumed by the Customer Installation that is generated by the embedded generation installation and delivered back to the local Distribution Network, accumulated from the date the meter is installed.	125.2

6.4 Metering requirements for embedded generation

6.4.1 General

It is a requirement under the NERs that where distributed generation facilities exist, Bi Directional Metering must be installed. Customers must contact their electricity retailer to arrange for appropriate metering where generation systems are connected and Bi Directional metering is not installed.

Bi-Directional structures for Ausgrid ToU metering include 21, 23, 25, 26, 27, 29, 61, 64 and 65.

All Bi-Directional Metering must be installed prior to the energising of the new or altered embedded generation system.

The customer must liaise with their Retailer and ASP to determine the best arrangement for their circumstance. A connection application must be submitted in advance and an Ausgrid job number issued prior to commencing work on installations intended for connecting embedded generation (see ES1 - Premises Connection Requirements for further details). Once completed, a NOSW must be submitted to Ausgrid for any service works conducted, and where Ausgrid Flat Rate or ToU metering has been removed, an AEMO B2B NOMW submitted to Ausgrid by the MPB.

For information regarding the process for obtaining approval to connect a small scale embedded generation system, refer to Ausgrid's document ES1 - Premises Connection Requirements as well as Ausgrid's "Connecting to the Network" page on our website <https://www.ausgrid.com.au/Common/Customer-Services/Business-and-commercial/Connecting-to-the-network.aspx>

Customers should contact their electricity Retailer for specific details related to their Type 4 metering, electricity account, or other Buy-Back tariff related issues.

Note: Voltage Rise calculations (as per Service and Installation Rules of NSW) will be required if the total connected embedded generation on any phase equals 5kW's or greater.

6.4.2 Net metered embedded generation requirements

Where a customer proposes to connect a small scale embedded generation facility to an installation for the purpose of generating electricity for use within their installation and/or to export any excess electricity back into Ausgrid's Network, the minimum requirement is for suitable Net metered bi-directional Metering installation to be installed to capture the exported energy.

The installation of a bi-directional meter is required even if the Customer's Installation may not generate energy back into the Ausgrid Network. This means that if the customer's installation has any embedded generation connected, a bi-directional Metering Installation must be installed.

The customer must contact their electricity retailer to arrange for any replacement metering.

Generation at multi-phase sites are permitted so long as they meet the requirements of ES1 - Premises Connection Requirements.

6.4.3 Registration of bi-directional energy flow in ToU meters

The National Electricity Rules requires the measurement of import and export power flows to be recorded separately. However there is also a requirement that the metering measurement is consistent whether the generation is attached to single phase, two phase or three-phase connections to the network.

All Ausgrid E3/E3c meters add the instantaneous (maximum every second) power flow (magnitude and direction) in each of the three phases. The resultant, depending on the dominant flow, is accumulated in the import or export kWh register. This approach achieves the consistency across the different network connection configurations and credits the customer for the full value of any generation. This is particularly important in examples such as single phase embedded generation systems connected to three phase supply. In such an example, the single phase generation will offset any consumption in the other two phases.

The following example illustrates how the meter will record energy.

If the following unity power factor current is flowing through the meter:

- (a) A Phase 8 Amps consumption (1.84kW @ 230V AC);
- (b) B Phase 12 Amps consumption (2.76kW @ 230V AC);
- (c) C Phase 7 Amps generation (1.61kW @ 230V AC).

The resultant power flow registered by the meter would be $+1.84\text{kW} + 2.76\text{kW} - 1.61\text{kW} \approx +3.0\text{kW}$ toward the premise.

The subsequent energy recorded by the meter would be based on this net power. Over a half hour period, this would register +1.5kWh of energy being consumed at the premise.

6.5 Metering With remote data acquisition capability

6.5.1 General

ASP's authorised by Ausgrid are not permitted to remove, install or alter metering which has remote data acquisition capability, such as Type 1-4 metering (see clause 7 for further information on identifying a Type 1-4 metering installation) or other Ausgrid Network installed metering with communications (such as chronic access or pre-Power of Choice Advanced Metering Infrastructure installations), unless the ASP has been directly engaged by an AEMO Metering Provider to do so.

Remote communications can be typically identified by the connection of a modem to the meter's serial port under the terminal cover of the meter. The modem itself is typically also located under the terminal cover and sometimes in an adjacent enclosure.

6.5.2 Remote communicating meters permitted to be removed

The only exception to clause 6.5 are for meters with the meter prefix, LGA, LGB and LGC (refer to figure 1 as an example). These meters were used in the Federal government funded Smart Grid Smart City (SGSC) project which has now been completed. If an ASP attends a site with this metering installed, the ASP is permitted to remove the meter and incorporated communications unit (self-contained in the upper part of the meter) and associated antenna wiring.

The antenna array consists of two adhesive antennas. If the ASP can remove the antennas without causing damage to the customers' switchboard, the ASP must remove both antennas and associated coaxial cabling. If the antennas cannot be removed due to the possibility of damaging the customers' switchboard, the ASP may cut the coaxial cable as close to the antenna as possible and remove the coaxial cabling. In both of the above cases where the cabling is removed, the ASP must ensure that the fire protection and moisture ingress capabilities of the switchboard are not compromised.



Figure 1 Example of a SGSC meter

7 METERING REQUIREMENTS TYPE 1 - 4 METERING INSTALLATIONS

7.1 General

Note: This chapter must be read in conjunction with the ES12 Metering Contestability document available from the Ausgrid Website.

In addition to the relevant requirements of this document, a Type 1-4 metering installation must also comply with specific requirements of the NER and AEMO Metrology Procedures. This includes the allocation of an MPB (to install and maintain the metering installation) and an MDP (to collect and process the metering data from the meter).

The behaviour of the MPB is also governed by the AEMO Service Level Requirements for MPB's which includes the obligation to comply with the requirements of the local jurisdiction (such as Service and Installation Rules of NSW and Code for safe installation of direct-connected whole current electricity metering in NSW) and the local network, such as described by this document.

The Metering Provider (MPB) and Meter Data Provider (MDP) must be appropriately accredited by AEMO to provide the relevant metering services in the National Electricity Market for the Type of metering installation installed.

Only an AEMO accredited MPB or their approved representative may install, remove or alter a Type 1-4 Metering Installation.

A guide to the identification of an existing Type 1 – 4 metering installation is as follows:

For metering installations where Plus ES MP is not the MPB, the meter is labelled with a third party Metering Provider name, (for example Metering Dynamics or Integral Energy);

For metering installations where Plus ES MP is the MPB, the meter is labelled with Ausgrid, EnergyAustralia or TCA, and has a program structure of structure 11, 22 or 72; it will contain the following register displays:

Table3: Ausgrid meter register displays

Structure 11		Structure 22		Structure 72	
Register Number	Description	Register Number	Description	Register Number	Description
1	Date	1	Date	1	Date
2	Time	2	Time	2	Time
3	Total Export kWh	3	Total Export kWh	3	Total Export kWh
14	Total lag kVar	4	Total Import kWh	4	Total lag kVar
15	Total lead kVar	93	Total lag kVar	63	Total Import kWh
		94	Total lead kVar	94	Total lead kVar

If any service works are required to be conducted during a Type 1-4 meter installation, and appropriately accredited and authorised ASP must be engaged to conduct these works. See ES4 – Accredited Service Provider Authorisation for further details.

The MPB is responsible for the quality of the work delivered by their meter installer.

7.2 Notification requirements for new installations

In addition to clause 5.2, for new CT or HV Metered Installations the MPB must submit a completed AEMO B2B NOMW within five working days of completion of the new metering works.

Any completed electrical installation work must be notified (using a CCEW form) to the local Installation Data Operations office within 14 days of work completion, as per regulatory requirements.

Note: Where any service works are involved a NOSW must be submitted to Ausgrid within two working days. See ES4 for further details.

7.3 Notification requirements for existing installations

Where a Type 5 or 6 Metering Installation is to be replaced by a Type 1-4 Metering Installation by an MPBs at an existing Customer Installation, a completed AEMO B2B NOMW showing meter numbers and final meter readings must be submitted to Ausgrid within five working days of the meter replacement.

Any completed electrical installation work must be notified (using a CCEW form) to the local Installation Data Operations office within 14 days of work completion, as per regulatory requirements.

Any recovered Ausgrid metering equipment must be returned to Ausgrid as per the requirements in Section 10.

Note: Where any service works are involved, a NOSW must be submitted to Ausgrid within two working days. See ES4 for further details.

7.4 Entry and Metering Works within Ausgrid substations

Non Ausgrid appointed MPBs are not permitted to conduct any metering work within Ausgrid sub-transmission, zone or distribution substations. Ausgrid will arrange for an appointed metering provider to conduct these metering services on behalf of the MPB. Ausgrid will enter a contractual arrangement with the applicant (MPB, Retailer or Customer) to allow these works to occur and provide a quotation under an AER regulated fee. If a network outage is required to conduct the works (eg. CT/VT accuracy testing) or a specific date is required for the works to be completed, the applicant should provide Ausgrid a minimum of six weeks' notice, so it can be scheduled into our planned outage works.

The MPB may only enter the substation to observe the work undertaken if accompanied by an Ausgrid appointed person. When onsite, the MPB must comply with any site rules, any instruction from the Ausgrid appointed person and Ausgrid's Electrical Safety Rules.

Alterations, upgrades and new connections must not be installed or remain within Ausgrid's substations.

To avoid future access inconvenience and expense it is strongly recommended that MPBs make arrangements to relocate any existing metering equipment from within Ausgrid substations to the customer's premises wherever possible.

For any enquiries with regard to access to substations please contact Ausgrid using the following email address meteraccess@ausgrid.com.au.

7.5 Commercial agreements

The new MPB must negotiate an agreement with Ausgrid or the incumbent MPB if it proposes to re-use existing suitable metering equipment (owned by Ausgrid or the incumbent MPB).

7.6 Compliance with Ausgrid's safety plans

All MPs and ASPs working on behalf of MPBs carrying out work on or near Ausgrid's distribution system must have current Ausgrid Authorisation in accordance with conditions detailed in publication ES 4 – Service Provider Authorisation and fully comply with Ausgrid's Electricity Network Safety Management System and Electrical Safety Rules.

Breaches of the conditions may lead to referral to NSW Fair Trading, AEMO and Safe Work NSW.

7.7 Controlled load tariff switching

Where controlled load functionality is required and Type 4 metering is installed, it is the MPBs responsibility to arrange for suitable load control functionality. The load control switching must be incorporated within the MPBs meter, and the functionality must comply with appendix B of ES7 - Network Pricing Guide, unless an exemption is agreed between the MPB and Ausgrid.

Ausgrid LCUs must not be left onsite unless the LCU is controlling more than one customers controlled load (e.g. multi pole relay).

If the existing load control is switched by a Type 5 E2 meter, this must be returned to Ausgrid as outlined in Section 10, so that a final read may be conducted.

7.8 Labelling and contact details

Type 1-4 Metering Installations installed by MPBs, must be clearly labelled with the name of the MPB, on the meters or the meter panel.

Each metering installation shall be clearly labelled on each meter panel with the National Metering Identifier (NMI) for the Type 1-4 Metering Installation.

7.9 Location of type 1-4 metering installations

The Service and Installation Rules of NSW allow s for remotely read meters to be located within a customer's tenancy at the customer's expense. The Service Protective Device must be accessible to Ausgrid as required by the Service and Installation Rules of NSW.

8 LOW VOLTAGE CURRENT TRANSFORMER METERING REQUIREMENTS

Customers' must consult with the customers' electricity retailer for any information related to specific metering requirements for the installation of LV CT metering and associated equipment.

Customers must ensure that these requirements are incorporated into the planning of their electrical installation.

Energisation of the switchboard by Ausgrid, may not be permitted unless appropriate metering has been installed by the MPB.

9 HIGH VOLTAGE METERING REQUIREMENTS

The following information defines the specifications and Ausgrid requirements for customers and their retailer/metering provider, wishing to connect to Ausgrid's Network at high voltage. Customers must ensure that these requirements are incorporated into the planning of their electrical installation. The customer must also ensure that the annual electrical energy consumption of the installation aligns to the Type of metering installation (Type 1-4) proposed to be installed. Consideration should also be given to any expected load growth of the installation. The minimum requirements of the metering installation Types can be found in Chapter 7 of the National Electricity Rules.

The installation must also comply with the current versions of Ausgrid Network Standard NS 195, AS3000, AS2067, the National Electricity Rules and AEMO Metrology Procedure.

A guideline for customers has been provided in Annexure B to assist in the design of their HV metering installation. Note that Annexure B is a guideline only and is not enforced by Ausgrid.

9.1 Instrument transformer compliance

All instrument transformers that are to be used for National Electricity Market metering purposes must comply with Chapter 7 of the National Electricity Rules and the AEMO Metrology Procedure.

Instrument transformers must have a valid pattern approval issued under the authority of the National Measurement Institute or, until relevant pattern approvals exist, a valid type test certificate.

Note: All instrument transformer designs MUST have a valid type test certificate that meets the full type test requirements of the appropriate Australian Standard even once the National Measurement Institute pattern approval exemption is lifted.

Each individual instrument transformer MUST be supplied with routine test results to the appropriate Australian Standard with traceability to National Standards and a statement of the Estimated Uncertainty of Measurement. Note: depending on the class of instrument transformer, different accuracy test points are required to be conducted on the transformer (e.g. class 0.5S CT requires an additional test point at 1% and a class 0.5ME CT requires an additional test point at 2.5%).

All reference/calibration equipment used for the purpose of meeting the routine and type testing obligations identified within this clause must be tested to ensure full traceability to test certificates issued by either:

- (a) A NATA accredited body; or
- (b) A laboratory recognised under the International Laboratory Accreditation Corporation (ILAC) mutual recognition agreement. Further details of ILAC laboratories can be found at www.ILAC.org/.

It is the responsibility of the customer to prove to Ausgrid that the test reports supplied comply with the above criteria. All test reports must be supplied to Ausgrid at least 2 weeks prior to the installation of the instrument transformers. Once these reports have been submitted, Ausgrid will review the reports and if the reports meet the requirements as defined by the National Electricity Rules, they are accepted and the customer is then notified. The customer will also be notified if the reports are unsuitable.

In addition, copies of the test reports must be forwarded to Ausgrid's local field operation office at least two weeks prior to the instrument transformers being installed.

If the type test and routine test are not supplied and accepted by Ausgrid, the installation will not be energised.

In addition to the above mentioned mandatory NER test requirements, the pre-commissioning tests outlined in NS195 must also be completed and results provided to Ausgrid prior to the proposed commissioning date.

9.2 High voltage metering installation documentation

Suitable drawings and supporting information, detailing the metering installation, must be submitted as part of the customers Installation Safety Management Plan (ISMP) for maintenance and auditing purposes.

9.3 Information required prior to electrification

The following information is a summary of what is required before energising a HV metered installation.

- Proof that the type of metering installation complies with the National Electricity Rules (clause 9);
- CT and VT test reports have been submitted to Ausgrid (clause 9.1);
- Drawings detailing the metering information (clause 9.2);
- A letter from the AEMO accredited Metering Provider stating that the metering installation meets the requirements of Chapter 7 of the National Electricity Rules.

10 RETURNING OF METERING EQUIPMENT

10.1 General

To avoid injury to Ausgrid staff, injury to others and damage, the following must be adhered to when returning Ausgrid metering assets:

- All equipment mounting screws must be removed.
- All residual cable must be removed from terminals.
- All equipment screws must be tightened (to avoid possible loss of screws in transit).
- All equipment that is removed from the meter board must be wet wiped with a damp rag to remove any surface dust immediately following the removal of the equipment.
- If the electrical board, meters or any other part of the metering enclosure contains or is suspected of containing asbestos, then the rags should be disposed of as asbestos-contaminated waste.
- If the electrical board or meters contain asbestos or if there is uncertainty about whether they contain asbestos, then 'Safe Work Practice 5 - Working on Electrical Mounting Boards (Switchboards) Containing Asbestos' and the requirements of NS211 apply.

Note: 'Safe Work Practice 5 - Working on Electrical Mounting Boards (Switchboards) Containing Asbestos' is part of the 'SafeWork NSW Code of Practice: How to manage and control asbestos in the workplace'. This document can be obtained from the SafeWork NSW website.

10.2 ASPs

When returning metering equipment and associated devices (e.g. LCU) to an Ausgrid Field Operations depot, the ASP must ensure that the meters are separated into the appropriate mechanical (asbestos waste and non-asbestos waste) and electronic return locations to allow for ease of sorting and disposal. Only Ausgrid meters are to be returned to Ausgrid Field operations depots.

Any removed meters that have been identified as containing asbestos material, then procedures, safety controls and personal protective equipment that are described in NS211 must be applied and disposed of in an approved manner.

ASPs must only return metering equipment which was removed due to works conducted under the NSW ASP scheme (eg. permanent disconnection of supply). ASPs conducting works for AEMO Metering Providers are to return metering as per the MPs procedures.

Flat Rate metering equipment is to be returned by ASPs to one of the following locations within ten days of removal unless other disposal arrangements have been agreed with Ausgrid.

ToU metering equipment is to be returned by ASPs to one of the following locations within ten days of removal.

ASP are to arrange access to disposal bins by contacting the Ausgrid security officer at the main boom gates upon arrival.

Homebush	Building 5 25-27 Pomeroy St Homebush, NSW 2140 Access via main boom gate	Days of Operation Monday to Thursday 08:00am – 03:00pm
Wallsend	Building 3 78 Abbott Street Wallsend, NSW 2287 Access via main boom gate	Days of Operation Monday to Thursday 08:00am – 03:00pm

10.3 MPBs

AEMO accredited MPBs are to have a documented or deemed agreement with Ausgrid for an alternate method of disposal for Type 6 metering and load control devices. Type 6 metering and load control devices are not to be returned to Ausgrid by MPBs or their contractors.

All removed type 5 metering must be returned to one of the two locations below. Where the Ausgrid metering assets are to be returned to Ausgrid, this is to be completed within ten days of removal.

Homebush	Building 5 25-27 Pomeroy St Homebush, NSW 2140 Access via main boom gate	Days of Operation Monday to Thursday 08:00am – 03:00pm
Wallsend	Building 3 78 Abbott Street Wallsend, NSW 2287 Access via main boom gate	Days of Operation Monday to Thursday 08:00am – 03:00pm

11 RECORDKEEPING

The table below identifies the types of records relating to the process, their storage location and retention period.

Table 4 – Recordkeeping

Type of Record	Storage Location	Retention Period*
Approved copy of the network standard	BMS Network sub process Standard – Company	Unlimited
Draft Copies of the network standard during amendment/creation	HPRM Work Folder for Network Standards (HPRM ref. 2014/21250/343)	Unlimited
Working documents (emails, memos, impact assessment reports, etc.)	HPRM Work Folder for Network Standards (HPRM ref. 2014/21250/343)	Unlimited

* The following retention periods are subject to change eg if the records are required for legal matters or legislative changes. Before disposal, retention periods should be checked and authorised by the Records Manager.

12 AUTHORITIES AND RESPONSIBILITIES

For this network standard the authorities and responsibilities of Ausgrid employees and managers in relation to content, management and document control of this network standard can be obtained from the Company Procedure (Network) – Production / Review of Engineering Technical Documents within BMS. The responsibilities of persons for the design or construction work detailed in this network standard are identified throughout this standard in the context of the requirements to which they apply.

13 DOCUMENT CONTROL

Branch Manager : Head of Asset Data & Systems

Content Coordinator : Manager Network Innovation & Intelligence

Annexure A – Obsolete Zellweger ZE22/3 load control relays

A1 General

A small number of Zellweger ZE22/3 load control relays presently installed on customer's installations within Ausgrid's distribution area may pose a personal safety risk if not handled correctly. ZE22/3 relays contain a glass tube that contains a low-level radioactive material. Whilst the glass tube remains intact, the radioactive material is not considered hazardous to people.



As a precautionary measure, ONLY Ausgrid appointed persons who are specially trained and equipped to safely handle the ZE22/3 relays are permitted to remove these devices from customer's installations e.g. due to a building demolition. All other service providers, MPBs and personnel must contact a local Ausgrid Metering Operations representative (see contact details in Table 5 below) to arrange for this work to be carried out by the specially trained and equipped Ausgrid appointed persons.

Note: Existing ZE22/3 relays are not permitted to be relocated on a customer's installation (refer to clause 6.2.4 of this document).

The ZE22/3 relay has a 'lower terminal cover' and an 'upper relay cover'. Removal of the 'lower terminal cover' by service providers (Level 2D – Metering or MPBs) whilst the ZE22/3 relay is in situ, is not considered to expose personnel to safety risks due to the radioactive material. However, the 'upper relay cover' must NOT be removed, as this could expose personnel to the risks associated with the radioactive material.

Ausgrid is currently carrying out the bulk replacement of all ZE22/3 relays installed throughout Ausgrid's distribution area.

Any return meter crates containing ZE22/3 relays should NOT be transported, as there are strict rules on the transportation of hazardous substances. Contact the local Field Operations representative (see contact details in Table 5 below) to arrange for the ZE22/3 relays to be collected.

If anyone should inadvertently come into contact with the glass tube contained within a ZE22/3 relay, they should immediately wash their hands/skin thoroughly with soap and water. If the glass tube is broken and a person comes into contact with its contents, they should immediately seek professional medical advice as a precautionary measure.

A2 Local Ausgrid representatives

Contact the local Ausgrid appointed representative (Metering Operations field team leader) in the appropriate Field Operations region where an existing ZE22/3 relay (installed on a customer's installation) is required to be removed. Contact should be made well in advance to ensure the timely completion of the job by Ausgrid's appointed Metering Provider.

Table 5 Local Ausgrid Appointed Contacts

Field Operations Region (where the ZE22/3 relay is installed)	Contact Telephone Number (Ausgrid Representative)
Hunter	(02) 4910 0206
Central Coast	(02) 4399 8078
Sydney North	(02) 9269 7351
Sydney South	(02) 9663 9388

The Field Operations representative will request the following information:

- (a) Name and contact telephone number of the service provider or electrical contractor making the request
- (b) Site address where the ZE22/3 relay is installed
- (c) General condition of the relay
- (d) Why the relay is being removed e.g. building demolition
- (e) Number of relays to be removed
- (f) The number of poles on the relay, the signal frequency (492, 750 or 1050 Hz) and the current tariff of each pole, (where the relay is being replaced by Ausgrid (as contestable work), rather than just removed)
- (g) Level of urgency of the job (when the job is required to be completed).

Annexure B – High Voltage Metering Guidelines

B1 Provision for instrument transformer testing

All instrument transformers that are used for National Electricity Market metering purposes are required to be tested for accuracy at routine intervals as defined by the National Electricity Rules. Consideration should be given in the selection and installation of all instrument transformers associated with the metering, to ensure primary injection testing of an individual instrument transformer is practically achievable.

B2 Voltage transformers

All voltage transformers should be minimum class 0.5 for loads up to 1000GWh per annum, with a minimum burden of 25VA and a voltage factor of 1.9. The customer must also consider site specific requirements as outlined in the Australian Standards identified in the following clauses.

Where the VT or VTs are installed within other switchgear the nameplate details of each VT should be indelibly and legibly marked on the outside of the switchgear.

B2.1 Type 1 installations

If the installation is determined to be classified as a Type 1 metering installation then the VTs should be class 0.2 with a minimum burden of 25VA and voltage factor of 1.9.

B2.2 Single phase VTs

Single phase inductive voltage transformers shall be manufactured and tested to comply with the current version of AS60044.2. Single phase capacitor voltage transformers shall be manufactured and tested to comply with the current version of AS60044.5.

The secondary voltage should be $110/\sqrt{3}$ VAC per phase.

The secondary winding terminals should be marked a1 and a2. The a1 terminal on each phase should be commoned and connected to an earth stud in the marshalling box. Where no marshalling box is fitted the earth point should be in the metering panel.

B2.3 Three phase VT

Three phase voltage transformers shall be manufactured and tested to comply with AS1243 - 1982.

The secondary voltage should be 110VAC line voltage.

The secondary star point should be connected to an earth stud in the marshalling box. Where no marshalling box is fitted the earth point should be in the metering panel. The neutral star point should be available at the secondary terminals.

B2.4 VT secondary terminal boxes

If the VT or VTs are to be installed outdoors the secondary terminals should be contained in an IP55 rated terminal box. The terminal box should have at least two conduit entry points capable of accepting 25mm conduit terminators and of the appropriate size to allow the easy termination of conductors, allowing for a minimum bending radius of 25mm. The lid of the terminal box is to be removable only by use of a tool and is to have the facility to be appropriately sealed by the approved Meter Provider to prevent unauthorised access.

B2.5 VT circuit protection

The primary circuit of the metering VT should be protected by a high speed protection device. The customer is advised to contact the switchgear designer or manufacturer prior to installation in order to determine the suitable protection device. Consideration should also be given to installation of a primary protection device for the VT even when the VT is installed within a high speed protection zone, this may prevent interruption of customer supply in the case of a VT failure.

The secondary circuit protection of the metering VT should be as per clauses B5, B7 and B9 and as per the reference drawings available on the Ausgrid website.

B3 High voltage current transformers

Current transformers shall be manufactured and tested to comply with the current version of AS60044.1. All CTs should be class 0.5S with a minimum burden of 5VA. The customer must also consider site specific requirements as identified in this Australian Standard.

All new HV installations should use three single phase CTs with 1 amp secondary windings. Contact your Electricity retailer or metering provider to obtain details of the required CT ratio (or ratios if multi-tap CTs are required because of anticipated load growth). If multi-tap CTs are used the maximum tap setting should be equivalent to the rating of the associated switchgear. CT ratios appropriate to the connected/anticipated load must be used.

Where possible, all CTs should be installed so that the polarity of the HV terminals/P1 is facing the source of supply. If the P1 side of the CT faces the source of supply then the S1 terminal will be deemed to be the secondary polarity terminal. In the instance where CTs are installed in a stack within a circuit breaker and the polarity of the HV terminals/P1 cannot be installed to face the source of supply, the polarity of the secondary cabling is to be altered at the circuit breaker marshalling box and a label should be installed to indicate the altered polarity.

Where the CTs are installed within other switchgear their nameplate details of each CT should be indelibly and legibly marked on the outside of the switchgear.

If the CTs are to be installed outdoors the CT secondary terminals should be contained in an IP55 rated terminal box. The terminal box shall have at least one conduit entry point capable of accepting a 25mm conduit terminator. The lid of the terminal box is to be removable only by use of a tool and is to have the facility to be appropriately sealed by the approved Meter Provider to prevent unauthorised access.

The CT secondary terminals should be marked 'S1' to 'Sn'. All CT ratios of multi-tap CTs should be brought out to terminal studs. Where a marshalling box is used, all CT ratios should be terminated within the marshalling box. Where a marshalling box is not used, all CT ratios should be terminated in the metering enclosure.

CT non-polarities should be commoned and connected to the earth stud in the marshalling box. Where no marshalling box is fitted, the CT non-polarities should be commoned and connected to earth stud in the metering panel.

B3.1 Type 1 Installations

If the installation is determined to be classified as a Type 1 metering installation, or there is a chance that it may be determined as Type 1 in the future, then the CTs should be class 0.2S with a minimum burden of 5VA. In addition to the three revenue CTs an additional three class 0.2 CTs should be installed to provide the installation with full check metering.

B3.2 Type 2 Installations

If the installation is determined to be classified as a Type 2 metering installation, or there is a chance that it may be determined as Type 2 in the future, additional CTs will be required for partial check metering. Partial check metering should utilise a second set of CTs. These CTs may be part of a CT circuit that is shared with other equipment as long as the shared circuits CTs have a class of no more than double the required class of the revenue metering CTs. Where a shared CT circuit is not available, a separate set of three CTs (one per phase) will be required with a class of no more than double the required class of the revenue metering CTs.

B4 High voltage combined transformers

Combined transformers shall be manufactured and tested to comply with the current version of AS60044.3 and meet the appropriate requirements of this document.

B5 Marshalling box

In situations where access to the terminals of each CT is not readily available for burden measurement a marshalling box should be installed as close as practical to the CT location.

If the VT or VTs are installed remote from the metering location, a marshalling box should be installed as close as practical to the location of the VT or VTs to allow burden measurement.

The CT and VT secondary circuits may be terminated in the same marshalling box where required.

Depending on the instrument type that will be marshalled within, the box should be of adequate size to accommodate the following equipment:

B5.1 VT/s

- 3 black HRC fuse holders. Alstom Safeclip SC20H or similar
- 1 white, HRC fuse holder. Alstom Safeclip SC20HWH or similar
- Stud type terminals to terminate all VT secondary winding. (Utilux H3820 or equivalent). Tunnel type links and slide links will may not be accepted.

B5.2 CTs

- Stud type terminals to terminate all CT secondary wiring, including all ratios. (Utilux H3820 or equivalent). Tunnel type links and slide links may not be accepted.

The potential fuses and link within the marshalling box should have the facility to be appropriately sealed by the approved Meter Provider to prevent unauthorised access.

All terminals should have a cover that can be appropriately sealed by the approved Meter Provider to prevent unauthorised access.

If the marshalling box is to be installed outside, an appropriate weatherproof enclosure is to be used. It should have at least two conduit entry points capable of accepting 25mm conduit terminators.

All fuses and links contained within the marshalling box/s should be numbered and labelled appropriately. A corresponding function table with each items function is to be laminated and attached to the rear of the marshalling box/es access door.

B6 Secondary cables

A stranded multi-core cable is to be installed between the CT/VT terminal boxes, marshalling box and the metering panel in accordance with the requirements specified in the NSW Service and Installation Rules and ES 1 - Premises Connection Requirements.

Table 6 Cable size and maximum cable lengths for 1 amp CT secondary wiring

Conductor csa (mm ²)	1A 5VA Rated CT Length in metres	1A 15VA Rated CT length in metres
2.5	180	430
4	230	700
6	350	1050
10	590	1750
16	930	2800

Table 7 Cable size and maximum cable length for 5 amp (existing installations only) CT secondary wiring

Conductor csa (mm ²)	5A 5VA Rated CT Length in metres	5A 15VA Rated CT length in metres
2.5	6	20
4	10	30
6	15	45
10	25	70
10	40	110

Table 8 Cable size and maximum cable lengths for VT secondary wiring

Conductor csa (mm ²)	Length in metres
2.5	105
4	170
6	255
10	425
16	680

The CT and VT secondary cabling should be appropriately lugged using ring type terminal lugs and terminated using a stud type terminal in the instrument terminal boxes and marshalling box (Utilux H3820 or equivalent). The other end of the cable should be appropriately lugged using ring type terminal lugs and terminated in the metering panel using a stud type terminal (Utilux H3820 or equivalent).

All secondary cables should be marked with a cable number to identify each cable within the metering circuit. A cable number shall be on each end of a cable. The numbering may be as per the drawings as listed below and available via our website.

B7 Metering panels and enclosures

The metering panel should be located in an area which is accessible during normal business hours. The customer should make sure that access to the metering enclosure is never restricted or made unsafe.

The minimum enclosure size per meter is 580mm (h) x 580mm (w), with the depth behind the panel no less than 75mm. This panel should be hinged and be capable of being opened to the 90° position, additionally when the panel is in this position, a clearance of 200mm should be maintained between the front face of the panel and any fixed object. If check metering is to be installed, a separate 600mm (h) x 600mm (w) enclosure should be installed to accommodate the check metering and associated equipment.

For metering installations where it is preferable to install multiple metering points on a single panel, a panel layout design should be submitted to electricity retailer or metering provider during the design stage of the installation for approval.

If the metering equipment is installed outdoors, an appropriate weatherproof enclosure is to be used. The size of the enclosure will depend on the number of services to be metered, however the enclosure size per meter should be 580mm (h) x 580mm (w) x 250mm (d). Some installation environments may require the metering panel enclosure to have an IP55 rating to prevent the ingress of air borne particles, such as; coal dust etc. In corrosive environments, the enclosure should be made of a suitable material to prevent corrosion and to protect the metering equipment installed within. It is the responsibility of the customer to ensure that these additional risks are identified in the design stage and the appropriate equipment is selected. The enclosure should be locked in accordance with the NSW Service and Installation Rules. An Ausgrid approved locking system may be used, details of this locking system can be found in ES1 - Premises Connection Requirements.

The CT and VT secondary cabling should be terminated in the back of the metering panel using a stud type terminal (Utilux H3820 or equivalent). These terminations should have a cover that prevents any contact with live exposed conductors and has the facility to be appropriately sealed by the approved Meter Provider to prevent unauthorised access.

Isolation and test links should be provided at the front of the metering panel. The isolation and test links should have an insulated cover that when in position, no conductor is exposed and should also have a facility to be appropriately sealed by an approved Meter Provider to prevent unauthorised access.

The voltage and current test links should be of a slide link type that allows for an isolation point and contain sockets at the top and bottom of the link allowing for the insertion of a test plug. Phoenix URTK/ or equivalent would be suitable for this purpose. These links should be installed in such a way that the slide link will fall to the closed position if released.

The details of the layout and wiring configuration should be as per the list of drawings below. Detailed copies of these drawings and check metering drawings can be obtained via Ausgrid's website [https://www.ausgrid.com.au/NetworkStandardsDiagrams.aspx?docid=ES3 Part A](https://www.ausgrid.com.au/NetworkStandardsDiagrams.aspx?docid=ES3%20Part%20A)

Table 9 Layout and wiring configuration drawing list

Title	Drawing Number	Sheet Number
High Voltage Metering - Schematic Diagram, Wiring Diagram & Panel Layout	221330	1
High Voltage Metering - Labelling & Equipment Details	221330	2
High Voltage Metering - Schematic Diagram, Wiring Diagram & Panel Layout Installation without Instrument Transformer Marshalling Box/s	221331	1
High Voltage Metering - Labelling & Equipment Details Installation without Instrument Transformer Marshalling Box/s	221331	2
High Voltage Metering - Schematic Diagram, Wiring Diagram & Panel Layout Installation with Auxiliary Supply	221332	1
High Voltage Metering - Labelling & Equipment Details Installation with Auxiliary Supply	221332	2
High Voltage Metering - Schematic Diagram & Wiring Diagram Installation with Check Metering	221333	1
High Voltage Metering - Panel Layout, Labelling & Equipment Details Installation with Check Metering	221333	2
High Voltage Metering - Schematic Diagram & Wiring Diagram Installation with Check Metering and Auxiliary Supply	221334	1
High Voltage Metering - Panel Layout, Labelling & Equipment Details Installation with Check Metering and Auxiliary Supply	221334	2

B8 Earthing

As stated in clauses B2.2 and B2.3 the VT or VTs secondary star point should be connected to an earth stud in the marshalling box. Where no marshalling box is fitted the secondary star point should be earthed in the metering panel. The star point is to be earthed at only one point in the installation as close as possible to the source.

As stated in clause B2.4 CT non-polarities should be commoned and connected to the earth stud in the marshalling box. Where no marshalling box is fitted the CT non-polarities should be commoned and connected to earth stud in the metering panel. The CT non-polarities should be earthed at only one point in the installation.

The marshalling box enclosure/s, the metering panel enclosure/s and all metal components installed within the metering panel and marshalling box/es should be earthed. The earth cable size for a marshalling box enclosure installed in a high voltage switchyard should be of adequate size to handle the expected fault current specified for the yard. The same applies to the metering panel enclosure which is installed in close proximity to high voltage mains and apparatus, see Ausgrid's document NS 222, Major Substation Design Layout for further detail. The metal components installed within the marshalling box and the metering panel shall be earthed with at least a 4mm² cross sectional area conductor with a green/yellow sheath.

B9 Fuse ratings

All potential fuses should be installed to allow for cascading discrimination. Fuse sizes are to be as follows:

- Marshalling box – 10A
- Metering Panel – 4A
- Communications fuses – 2A

B10 Labelling

All equipment should be numbered and labelled as per the appropriate drawing. The label type for all fuses and terminations should be the engraved type and shall be adequately secured. All fuses and neutral links should have a label on the base along with a label on the fuse/link holder. A label schedule with details of the metering panels labelling can be found in the appropriate drawing.

A function table should be attached to the rear of the metering panels access door or on the panel itself if an enclosure is not used. A function table should also be attached to the rear of the marshalling box/es access door. The function table should indicate the function of each component and the fuse size where applicable. An example function table for the metering panel can be found below, it may be printed out, laminated and attached as required.

In all instances the metering panel should be clearly identified. This is achieved by the use of an engraved type label with the word "METERING". This label should have minimum 20mm high lettering and should be adequately secured to the metering panel.

If a marshalling box is used, it should be clearly identified. This is achievable by the use of an engraved label with words describing the equipment installed within, the voltage level and the service that the equipment is installed on.

Any marshalling box and/or metering panel/s installed outdoors and a weatherproof enclosure is used, these labels should be UV rated and shall be secured to the outside of the enclosure lid, the label should be secured to prevent the label falling off due to the effects of weather. The enclosure should retain its IP rating after the installation of any label.

The metering panel should be marked appropriately with the site address and the location of the VTs and CTs, if installed remote from the metering panel. If an auxiliary supply is used identified in clause B11, the location of the circuit protection should also be marked on the metering panel.

The following drawing of a HV metering panel function table can be used as a guide.

Table 10 HV metering panel item functions

ITEM	RATING	ITEM FUNCTION	MAKE	TYPE
F501	4A	METER 110V VT POTENTIAL FUSE - RED ϕ	ALSTOM	SAFECLIP SC20H BLACK
F502	4A	METER 110V VT POTENTIAL FUSE - WHITE ϕ	ALSTOM	SAFECLIP SC20H BLACK
F503	4A	METER 110V VT POTENTIAL FUSE - BLUE ϕ	ALSTOM	SAFECLIP SC20H BLACK
LK04	LINK	METER 110V VT POTENTIAL LINK - NEUTRAL	ALSTOM	SAFECLIP SC20HWH WHITE
LK05	-	METER POTENTIAL TEST LINK - RED ϕ	PHOENIX	LR7K/5
LK06	-	METER POTENTIAL TEST LINK - WHITE ϕ	PHOENIX	LR7K/5
LK07	-	METER POTENTIAL TEST LINK - BLUE ϕ	PHOENIX	LR7K/5
LK08	-	METER POTENTIAL TEST LINK - NEUTRAL	PHOENIX	LR7K/5
LK09	-	METER CURRENT TEST LINK - RED ϕ POLARITY	PHOENIX	LR7K/5
LK10	-	METER CURRENT TEST LINK - RED ϕ NON POLARITY	PHOENIX	LR7K/5
LK11	-	METER CURRENT TEST LINK - WHITE ϕ POLARITY	PHOENIX	LR7K/5
LK12	-	METER CURRENT TEST LINK - WHITE ϕ NON POLARITY	PHOENIX	LR7K/5
LK13	-	METER CURRENT TEST LINK - BLUE ϕ POLARITY	PHOENIX	LR7K/5
LK14	-	METER CURRENT TEST LINK - BLUE ϕ NON POLARITY	PHOENIX	LR7K/5
F515	2A	COMMUNICATIONS 110V POTENTIAL FUSE	ALSTOM	SAFECLIP SC20H BLACK
F516	2A	COMMUNICATIONS 110V POTENTIAL FUSE	ALSTOM	SAFECLIP SC20H BLACK
X1	-	REAR OF PANEL INCOMING CT AND VT TERMINATIONS	UTILUX	H3520
AC FUSE/TEST LINK/TERMINATIONS FUNCTION TABLE				

B11 Auxiliary supply

Whilst it is not a requirement to make provision for an auxiliary supply it may in some cases be of benefit to make a separate 110V AC supply available at the metering panel/s, this would allow the meter/s and communications device/s to be energised from a source independent of the VT allowing the metering and communications to remain energised at times when the VT is not in service. This is especially useful for standby supplies that may only be energised occasionally. For installations where this auxiliary supply is used it is a safety requirement to ensure that voltages of different levels do not exist at the meter/s. A two winding transformer with an output of 110V AC may be used to ensure this voltage segregation. If an auxiliary supply is to be used separate detailed drawings of this connection method. The drawings can be found as per clause B7 above.