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Queensland Electricity Connection and Metering Manual

Service and Installation Rules

energex
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ERGON ENERGY

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DISTRIBUTORS' CONTACT DETAILS

ENERGEX

Web Address	www.energex.com.au
EWR (Form 2) Enquiries,	1300 762 397 - Electrical Contractor Line - or
CT Metering Order Form	www.energex.com.au/service_providers/electrical_contractors.html
General Customer Service	13 12 53
Loss of Supply	13 62 62
Emergencies	13 19 62
C&I Substation Manual	www.energex.com.au/about_energex/technical_docs.html
Metering Locks	www.energex.com.au/customer_service/locksmiths.html
Technical Information - ECMM enquiries.	(07) 3407 6318

Ergon Energy

Web Address	www.ergon.com.au
Form A Enquiries, CT Metering Order Form	www.ergon.com.au/contractors,-suppliers--and--developers/forms-manuals--and--standards/electrical-contractors
General Customer Service	13 10 46 For all areas - New Applications, Point of Attachment Site Visits, Breaking Meter Seals; or by fax: (07) 4922 7562. E-mail requests can be sent to customerservice@ergon.com.au or by completing the Contact Form as provided under "Contact Us" on Ergon Energy's Web site: www.ergon.com.au
24 Hour Faults and Emergencies	13 22 96
Metering Locks	1800 233 333 toll free number. Metering Locks can be purchased from API Security (Queensland Locksmiths) by phone or on-line at www.queenslandlocksmiths.com.au .
Technical Information - ECMM enquiries.	1800 237 466 Electrical Contractor Hotline (EC Use only)

Ergon Energy – Metering Locks - Trade Orders

The API Security (Queensland Locksmiths) ordering system has primarily been set up for lock sales to individual customers where customer details are required, and passed on to Ergon Energy for updating in the Customer Information System. However the system has also been set up to cater for "Trade Orders". These Trade Orders allow electrical contractors, switchboard manufacturers and Ergon Energy staff to purchase metering locks without the requirement to provide customer information. It is necessary to advise API Security (Queensland Locksmiths) when phoning that a Trade Order is required. The Trade Order section is also available via the web site.

People utilising the Trade Order section are requested to provide customer and location details to Ergon Energy as soon as the metering lock is installed, so this can be recorded in the Customer Information System.

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DIAL BEFORE YOU DIG

Phone 1100 - free call (except from mobiles) Fax 1300-652-077

Website www.1100.com.au

Dial before you Dig is the national referral service for information on the location of underground infrastructure.

Australia's major service providers have a single web-enabled information service for information on the location of underground communications, gas, water and electricity infrastructure.

The Dial before you Dig online service is available 24 hours a day and enables users to have more control over their enquiry as you detail the dig site on the mapping software yourself.

Use the website to ensure that you 'Dial Before You Dig' before any excavation work.

When calling the 1100 phone number the operator may require the following:

- your name and address
- name of company
- contact telephone number
- fax number for return information
- contact name on site
- site address and both nearest cross streets
- start date of proposed work
- type of work being carried out

Note: Section 62 of the Queensland Electrical Safety Regulation 2002 has requirements for excavating near underground electrical services.

ASBESTOS WARNING

Older type switchboard and meter panels may contain asbestos. Electrical workers who are required to work on these panels need to identify if this hazard is present and, if necessary, take appropriate action. Old Zelemite (black) electrical switchboards can contain up to 20% asbestos. When working on an electrical switchboard that is aged (pre 1987), assume the presence of asbestos, even if it is not marked as such.

Asbestos information is available on the Workplace Health and Safety Queensland web site www.whs.qld.gov.au under the heading "Health Topics".

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FOREWORD

The Queensland Electrical Connection and Metering Manual (*ECMM*) has been compiled in conjunction with the Network Engineering Standards Department of *ENERGEX* and the Network Standards Department *of Ergon Energy*.

Note: Printed versions of the *ECMM* are “uncontrolled copies” - the latest version is available on the *ENERGEX* website (www.energex.com.au) or *Ergon Energy* website (www.ergon.com.au).

Safety

In all activities undertaken, the safety of our employees, contractors, customers and the community is paramount. Safety is our number one value and there is a commitment to ensuring that "safety must come first" to achieve a no injuries workplace. In accordance with legislative requirements we have developed Policies, Standards and Work Practices that our workers are required to follow to ensure the safety of themselves, other workers, customers and the community. We trust that electrical contractors and persons in control of sites will appreciate that our workers will not undertake any work in a situation where there are uncontrolled risks inconsistent with our safe systems of work.

Disclaimer

Whilst the *ECMM* contains material relevant to the electricity industry legislation, codes of practice and standards, it is not intended to provide legal advice on how *electrical contractors* can meet their own statutory obligations or comply with legislation, codes of practice or industry standards such as AS/NZS 3000 (Wiring Rules).

The *ECMM* does not provide advice for the purposes of section 64A of the *Electrical Safety Regulation 2002*. The *Electrical Safety Act 2002*, *Electrical Safety Regulation 2002* and associated codes of practice establish requirements for electrical safety and place obligations on employers, self-employed persons and others. These documents may be obtained from the Queensland Government website (www.justice.qld.gov.au).

Whilst care has been taken in the preparation of the *ECMM*, the distribution entities do not guarantee that the information contained in the *ECMM* is accurate, complete or up to date at time of publication. To the extent permitted by the relevant legislation the *distributor* will not be responsible for any loss, damage, cost or expense incurred as a result of any error, omission or misrepresentation in relation to the information contained in the *ECMM*.

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PURPOSE AND SCOPE

The purpose of this manual is to promote industry uniformity through standardisation of practices throughout Queensland. The document is for use by *Electrical Contractors*, Consulting Engineers, Architects and others directly concerned with electrical installations that are connected, or are to be connected, to the respective supply network.

Metering installation compliance and obligations contained in this manual forms part of the (Queensland) *Electricity Industry Code* and the *National Electricity Rules*.

DEFINITIONS, ABBREVIATIONS AND ACRONYMS

Unless otherwise stated definitions, abbreviations and acronyms used in AS/NZS 3000 (Wiring Rules) and the current Legislation referenced in the *ECMM* have the same meaning when used in this document.

Refer to the Glossary of Terms for general definitions.

Note: Words and terms defined in the Glossary are identified within the text by italicising (e.g. *distributor*).

REFERENCES

Referenced Legislation:

Electricity Act 1994 (Qld)

Electricity Regulation 2006 (Qld)

Electricity Industry Code (8th Edition) (made under the Electricity Act 1994 (Qld))

Electrical Safety Act 2002 (Qld)

Electrical Safety Regulation 2002 (Qld)

Electrical Safety Code of Practice 2001 – Working near exposed live parts

Queensland Government Gazette – Notified Prices (Tariff Gazette)

Workplace Health and Safety Act 1995 (Qld)

Referenced Standards:

AS1243	Voltage transformers for measurement and protection
AS 1397	Steel sheet and strip - hot dip zinc-coated or aluminium/zinc-coated
AS 1657	Fixed platforms, walkways, stairways and ladders - Design construction and installation
AS 2067	Substations and high voltage installations exceeding 1kV ac
AS/NZS 2430.3.4	Classification of hazardous areas - Examples of area classification - Flammable gases
AS/NZS 3000	Wiring Rules
AS/NZS 3012	Electrical installations - Construction and demolition sites
AS 4777.1	Grid connection of energy systems via inverters - Installation requirements
AS 4777.2	Grid connection of energy systems via inverters - Inverter requirements
AS 4777.3	Grid connection of energy systems via inverters - Grid protection requirements
AS 5601	Australian Gas Code
AS 6002	Domestic electric meter enclosures
AS/NZS 61000 Series	Electromagnetic compatibility (EMC)
AS 60044 series	Instrument transformers
AS 60974.1	Arc welding equipment - Welding power sources

RESPONSIBILITIES

The Customer:

- selects an electricity *retailer*;
- where applicable, negotiates or nominates an agent to negotiate provision of the electricity supply with the *distributor*;
- contacts their *retailer* when advised by an *electrical contractor*;
- for initial connections, the customer is responsible to ensure trees are cut/trimmed to provide clear access for an overhead service;
- provides a safe working environment for the *electrical contractor*, meter reader, etc;
- ensures the meter enclosure is accessible at all times. If behind a locked gate ensures that the gate is fitted with the *distributor's* metering lock;
- ensures the meter enclosure is clear of vegetation and that the meter reader can read the meter without stepping on, or damaging valuable plants etc;
- ensures that the *point of supply* is clear at all times to allow safe access by the *distributor's* personnel;
- notifies the *retailer*, distributor and metering provider when supply is to be permanently disconnected from a *premises* (supply abolishment).

The Relevant Distributor:

- negotiates provision of the electricity supply with the *customer* or the *customer's* agent (generally an *electrical contractor*);
- transports and delivers electricity which is purchased by *retailers* and sold to *customers*;
- examines and tests the *consumer's mains*, main switchboard and main earth of a customer's installation before it is initially connected to the *distributor's* electricity network;
- may be the *metering provider*;
- cannot connect the electricity supply to a customer's installation until the *customer* has selected a *retailer*, the *retailer* has requested the connection, and the metering is in place (with the exception of unmetered supplies);
- is responsible for the reliability and quality of the electricity supply at the *point of supply*;
- is responsible for the issue of *NMIs*.

The Relevant Retailer:

- purchases electricity and sells it to *customers*;
- nominates prices and negotiates contracts where applicable, for the sale of electricity to *customers*;
- where the *distributor* is not responsible for the metering, provides the *distributor* with details of the *responsible person* and/or *metering provider*;
- requests the *distributor* to connect, disconnect or alter the customer's installation in accordance with the customer's contract (*SOR* if applicable).

The Electrical Contractor:

- ensures all electrical work is in accordance with Queensland Legislation, AS/NZS 3000 (Wiring Rules), other relevant Standards and the requirements of the *ECMM* (in particular ensuring that unterminated cables cannot be energised by inserting a fuse or link or by closing a switch or circuit breaker);

- where 'exceptional circumstances' occur, ensures that permission is obtained by submitting a written request to the *distributor* for a variation;
- ensures that the *distributor* is advised when there is a significant increase in the electrical load at an installation;
- advises the *customer* when increases in load require changes to the electrical installation including meter changes;
- on completion of electrical work that involves metering or metering alterations, advises the *customer* that they must contact the *retailer* and notify that the work is complete (See note in Clause 2.2);
- issues the *customer* with a certificate of testing and compliance;
- submits appropriate forms in a timely manner and ensures that the information on the forms is accurate (e.g. correct address);
- notifies the *distributor* of any broken metering seals;
- rectifies any departures from this manual that have been identified by the *distributor*;

The Electrical Consultant:

- designs the electrical installation in accordance with Queensland Legislation, AS/NZS 3000 (Wiring Rules), other relevant Standards and the requirements of this manual;
- where 'exceptional circumstances' occur, ensures that permission is obtained by submitting a written request to the *distributor* for a variation;
- on large projects liaises with the *distributor* to ensure adequate supply is available when required;
- ensures that the *distributor* is advised when there is a significant increase in the electrical load at an installation;
- advises the *customer* when increases in load require changes to the electrical installation including meter changes.

Stakeholder Interaction Diagrams:

The following diagrams have been included as a guide to assist the users of this manual to understand the process interaction between the customer, electrical contractor, retailer, distributor and metering provider:

1) Initial Connection - Direct Connected Metering;
2) Initial Connection - Current Transformer Metering;
3) Electrical Installation Work Involving Metering Changes;
4) Service and Metering Change - Additional Phases;
5) Service Alteration - No Metering Changes;
6) IES Connection to the Distribution Network;
7) Initial Connection - High Voltage Installation.

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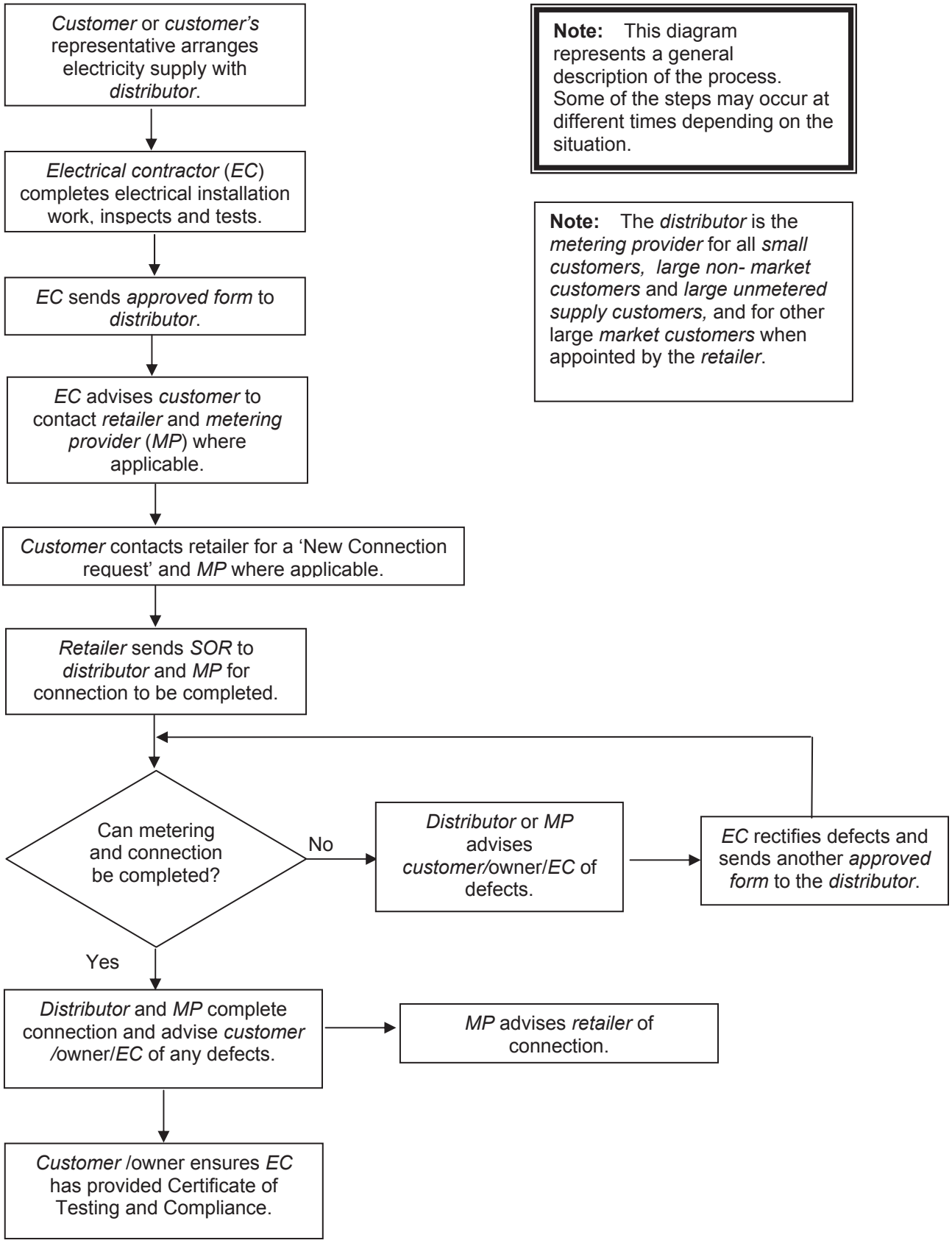
1) Initial Connection - Direct Connected Metering



Note: This diagram represents a general description of the process. Some of the steps may occur at different times depending on the situation.

Note: The *distributor* is the *metering provider* for all *small customers, large non- market customers* and *large unmetered supply customers,* and for other large *market customers* when appointed by the *retailer*.

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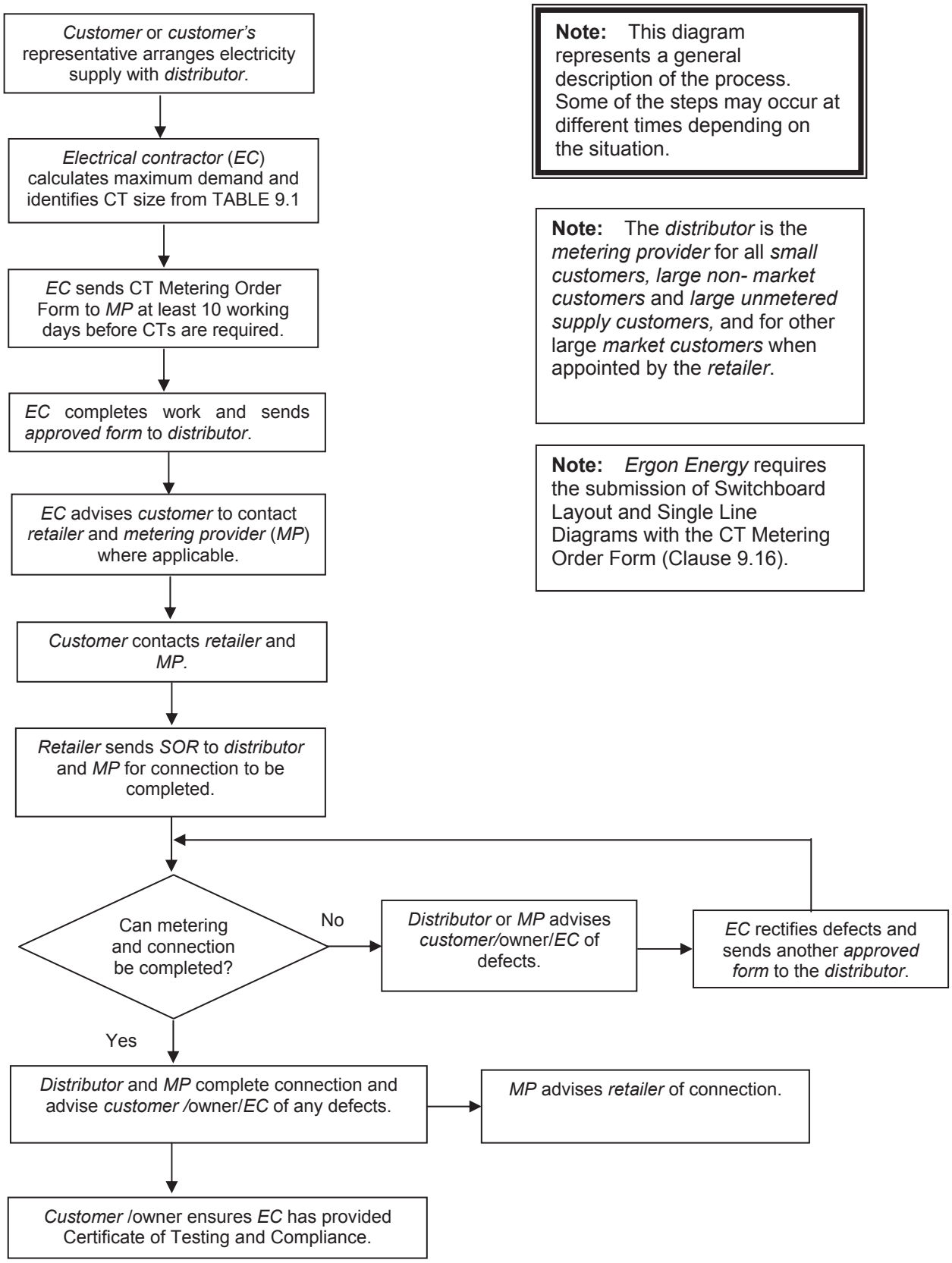
2) Initial Connection - LV Current Transformer Metering



Note: This diagram represents a general description of the process. Some of the steps may occur at different times depending on the situation.

Note: The *distributor* is the *metering provider* for all *small customers, large non- market customers* and *large unmetered supply customers,* and for other large *market customers* when appointed by the *retailer*.

Note: *Ergon Energy* requires the submission of Switchboard Layout and Single Line Diagrams with the CT Metering Order Form (Clause 9.16).

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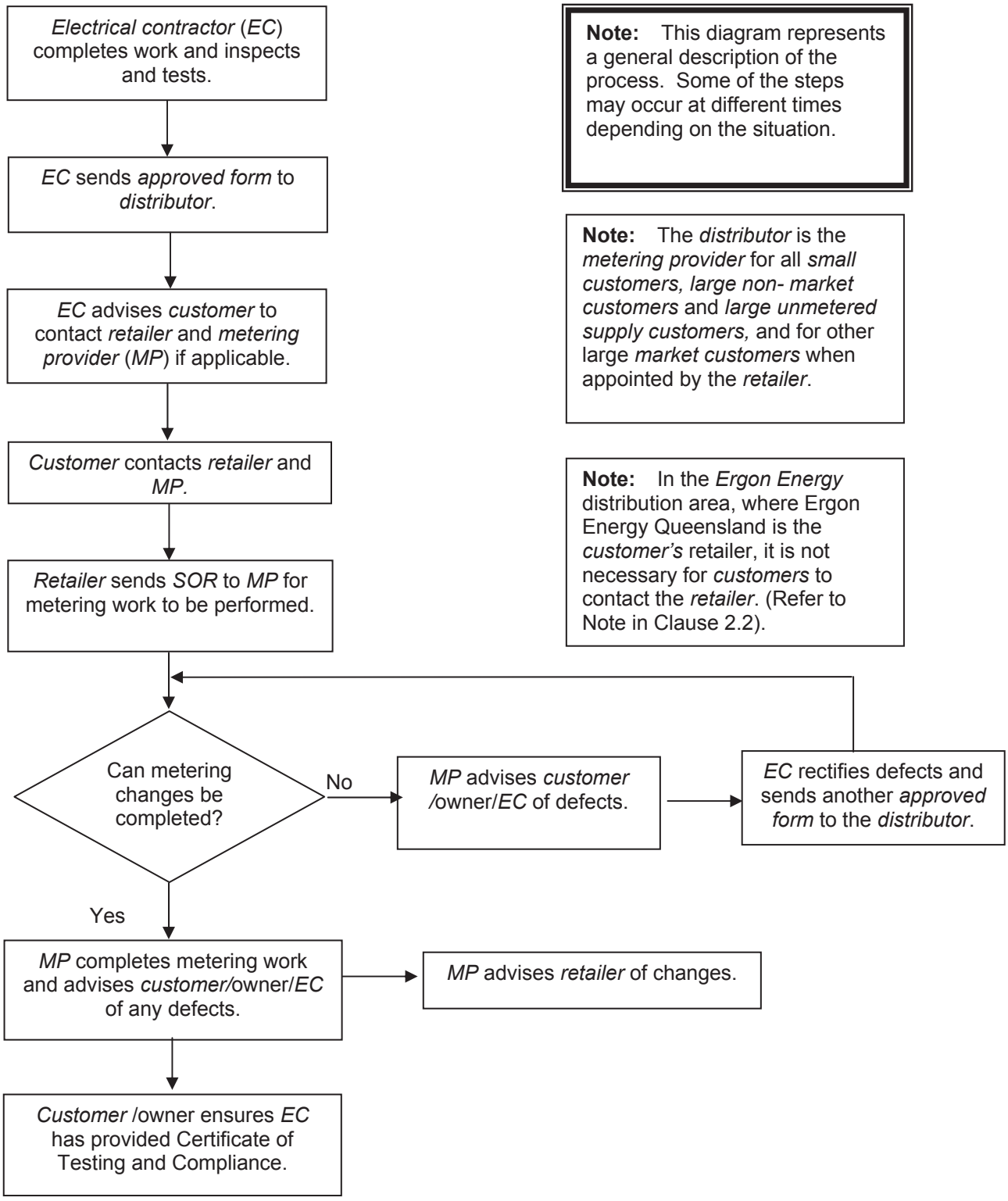
3) Electrical Installation Work Involving Metering Changes



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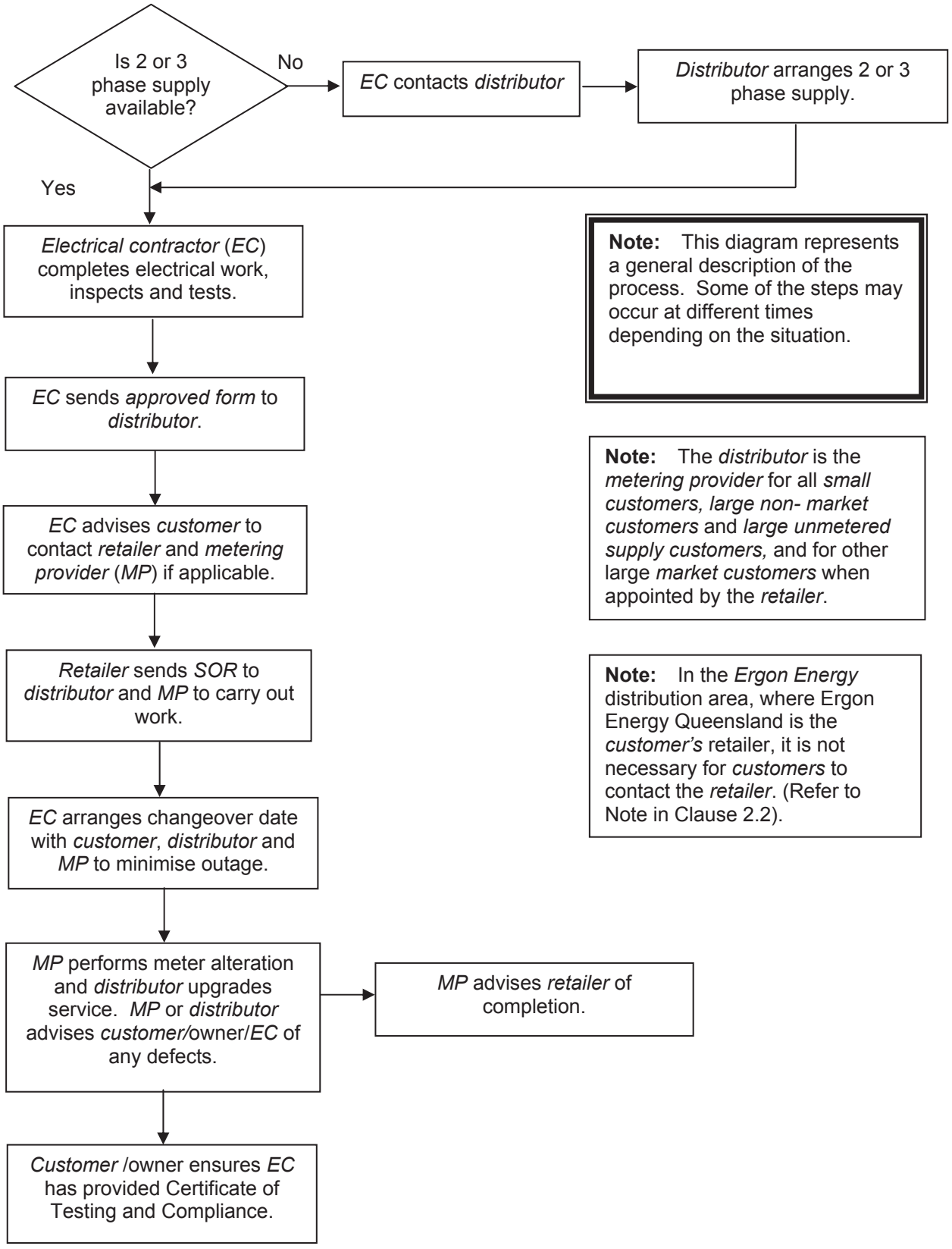
4) Service and Metering Change - Additional Phases



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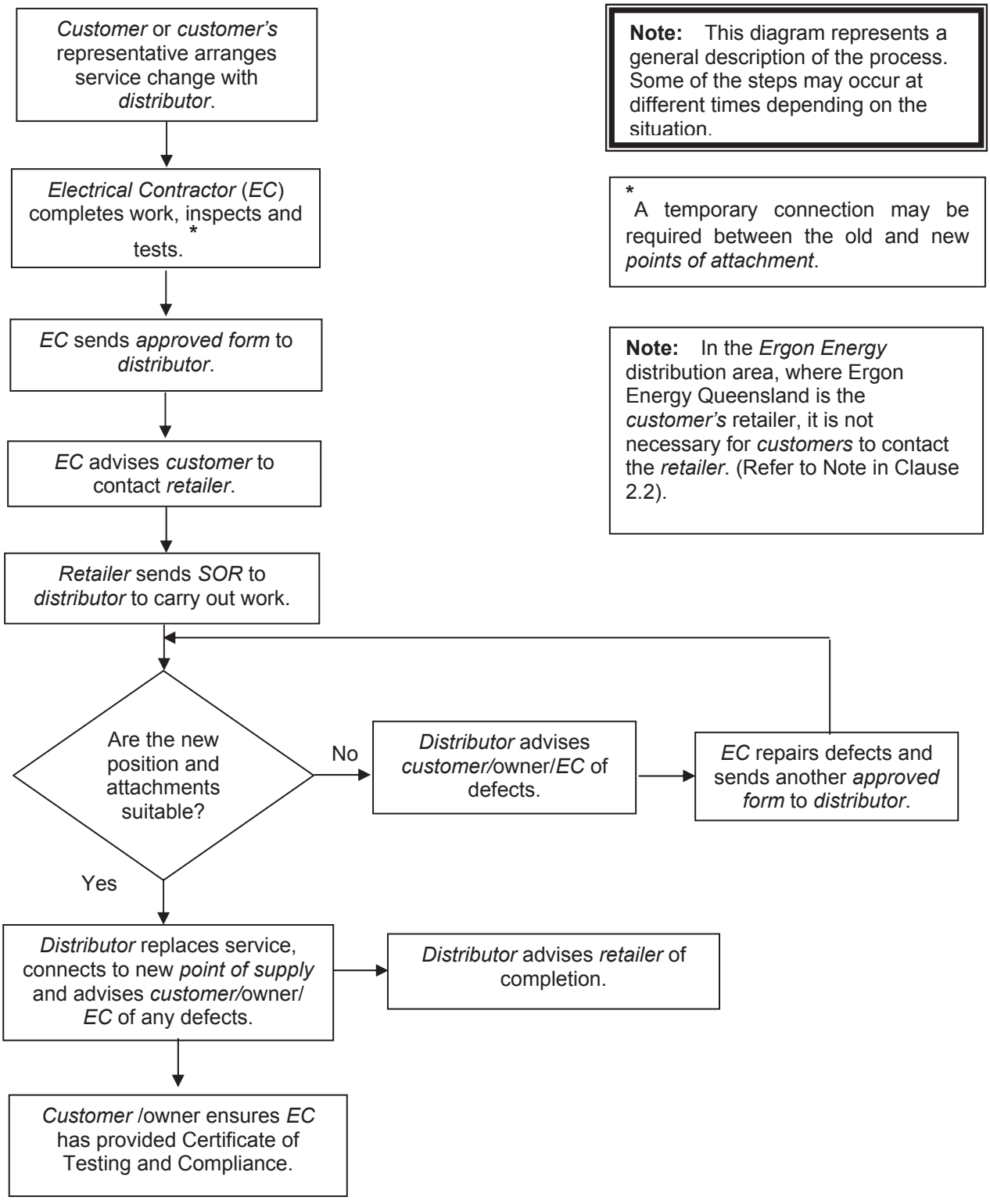
5) Service Alteration - No Metering Changes



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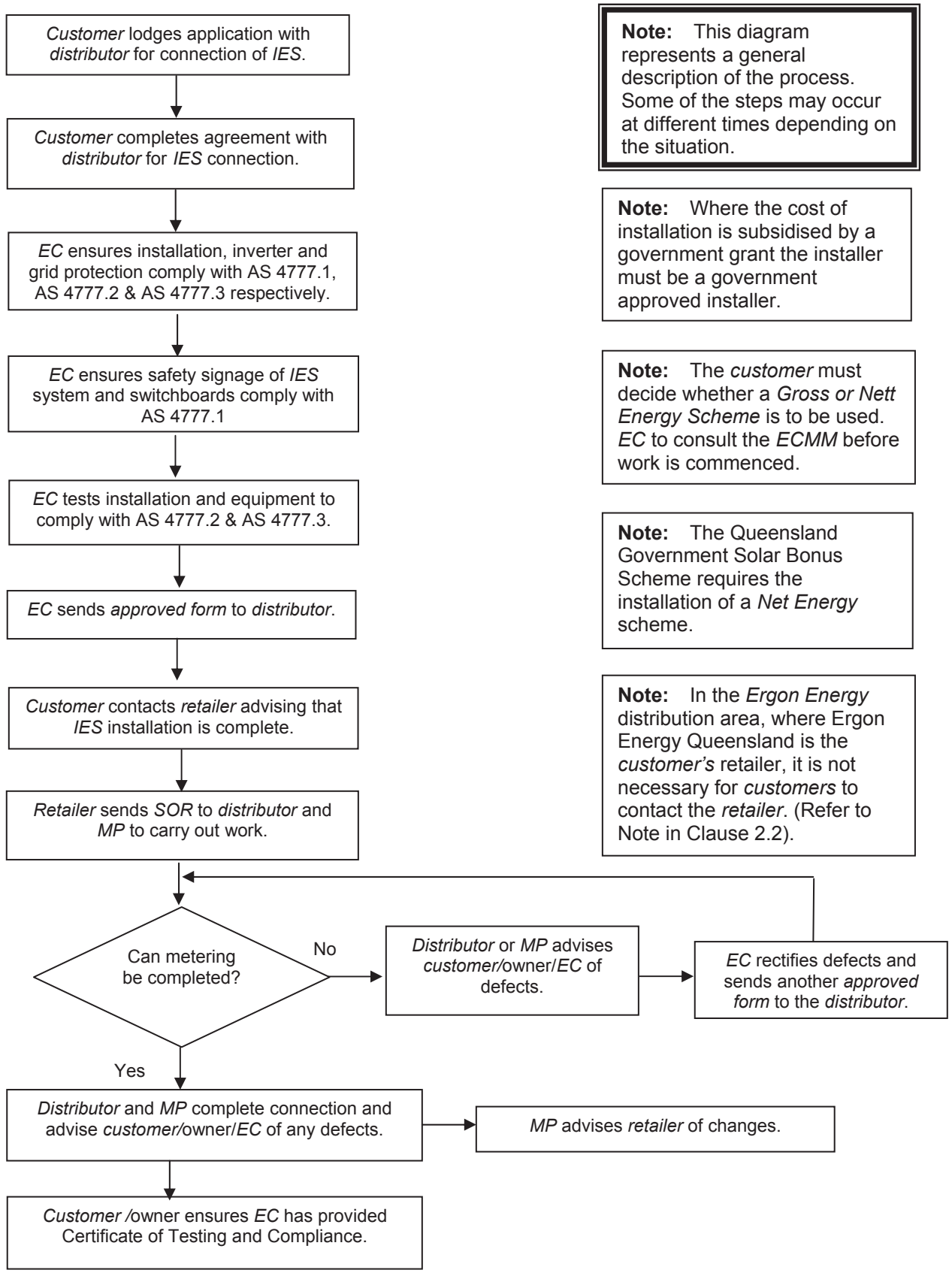
6) IES Connection to the Distribution Network



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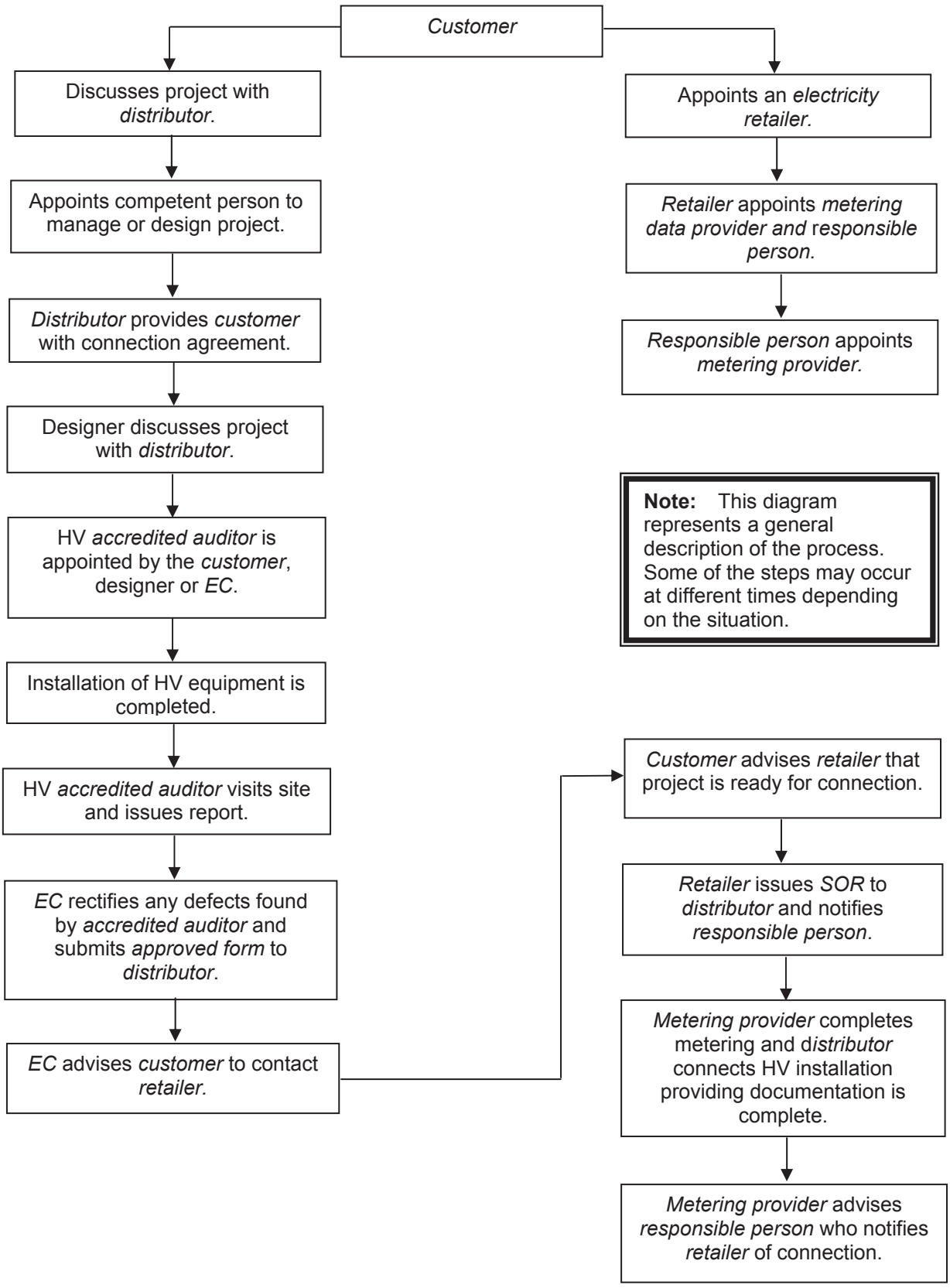
7) Initial Connection - High Voltage Installation



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1. IMPORTANT INFORMATION

1.1. Use of this document

This document is to be read in conjunction with the current:

(a) Australian Standards, in particular AS/NZS 3000 (Wiring Rules).

(b) Relevant Legislation and respective Regulations and Codes (see References pg 5).

(c) The *National Electricity Rules*.

Note: The requirements of the Queensland Electricity Legislation are to be considered in the design, installation, operation and maintenance of the customer's electrical installation

This is a self-contained document except where it specifically refers to other related documents and supersedes previous versions of both the *ENERGEX* and *Ergon Energy* Electricity Connection and Metering Manuals.

1.2. Scope

This document provides guidelines for connection of supply and metering of a customer's installations.

Where departures from these guidelines may be necessary, prior consultation with the *distributor* will be required. (Refer to Clause 1.4, Exceptional Circumstances).

Note: If there is any inconsistency between the guidelines provided in the *ECMM* and -

(a) the relevant legislation (i.e. the *Electricity Act 1994*, the *Electrical Safety Act 2002* and their respective Regulations or Codes of Practice), AS/NZS 3000 (Wiring Rules) and the *National Electricity Rules*, or

(b) the terms contained in a *distributor*'s letter of offer to supply, or a connection agreement;

then the relevant legislation set out above at clause 1.2 (a), shall prevail in the first instance, followed by Clause 1.2 (b), the terms of a letter of offer to supply or a connection agreement.

1.2.1 Small Customers

The conditions of supply and metering requirements detailed in this document apply for all *customers* who consume less than 100MWh per annum (i.e. a *Small Customer*) and are connected to the *distributor*'s electricity network.

1.2.2 Large Non-Market Customers

The conditions of supply and metering for *customers* who consume 100MWh or more annually, have a contract with Ergon Energy Queensland (i.e. a *Large Non-Market Customer*), and are connected to the *Ergon Energy* electricity network, are detailed in this document.

1.2.3 Exemption for Large Market Customers

The conditions of supply and metering for *customers* who are Registered Participants according to *National Electricity Rules,* consume 100MWh or more annually and have an Electricity Sales Contract with a *retailer* (other than Ergon Energy Queensland), are detailed in the *National Electricity Rules* Chapter 5 - Network Connection.

Where specific detail is not covered by the *National Electricity Rules* the requirements of this document apply. Connections for new *large customers* must comply with the *Queensland Electricity Regulation 2006*.

1.2.4 Un-metered Supplies

The conditions of supply for *customers* whose *point of supply* is not metered, and are connected to the distribution network, are detailed in this document.

1.2.5 Remote Generated Areas

The conditions of supply and metering requirements detailed in this document apply to all *customers'* installations and are to be read in conjunction with *Ergon Energy* documentation "Guidelines for Connection of Electrical Installations at Isolated Systems."

1.3. Failure to comply with this manual

Should an installation not satisfy the requirements of these and/or other applicable rules, the connection of electricity supply may be delayed or withheld, and installations with supply may be disconnected, until such time as the non-compliance(s) has been rectified.

1.4. Exceptional Circumstances

In exceptional circumstances the stated requirements contained within the *ECMM* may be waived and/or modified by the submission of a written request to the relevant *distributor*. (Refer to Clause 1.6 for contact details).

The request shall include all of the following:

(a) A detailed statement of the reasons why non compliance with this manual is sought.

(b) Full details and diagrams, as necessary, showing the specific aspect of a requested variation to the *ECMM.*

(c) Property location details.

No action or variation should be undertaken until a written approval from the *distributor*, has been received.

Note: Any variation approval will **only apply to the individual property** as listed in the request (i.e. it does not cover, or set any precedent, for any other installation).

1.4.1 Request for an interpretation of the ECMM

A request for an interpretation of the *ECMM* must be made in writing to the relevant *distributo*r. A reply will be provided by the *distributor* within 10 working days from receipt of the written request.

1.4.2 Request for dispensation from the ECMM

A request for dispensation from the requirements of the *ECMM* must be made in writing to the relevant *distributor*. A reply will be provided within 10 working days from receipt of the written request.

1.4.3 Request for an ECMM amendment

A request for an amendment of the *ECMM* must be made in writing to the relevant *distributor*. Acknowledgement of receipt of the amendment will be provided within 10 working days from receipt of the written request.

1.5. Enquiries

Unless indicated, enquiries are to be by email or by written communication.

1.5.1 Enquiries before the work commences or while the work is underway.

Contact the phone numbers on page 1 of the *ECMM*.

1.5.2 Enquiries regarding defects identified by the distributor

Contact the *distributor* advising the following information:

(a) *Customer* name and address and *NMI* if available;

(b) Reference number on the *distributor*'s document;

(c) Nature of enquiry;

(d) *Electrical contractor's* number and return address details (if applicable).

If the installation has not been connected to supply a reply will be provided within 2 working days from receipt of request.

If the installation has been connected to supply a reply will be provided within 5 working days from receipt of request. (Refer to Clause 1.6 for contact details).

1.6. *Distributors'* Contact Details for *ECMM* Correspondence

Contact details for *ECMM* amendments or enquiries are:

ENERGEX:	Email	customerservice@energex.com.au
	Write to:	ENERGEX Limited ECMM Request
		GPO Box 1461
		BRISBANE Qld 4001
Ergon Energy:	Email:	customerservice@ergon.com.au
	Write to:	Ergon Energy ECMM Request
		PO Box 308
		ROCKHAMPTON Qld 4700

1.7. Historic Buildings and Flora with Vegetation Protection Orders

The *electrical contractor* should consult the owner if the building appears to have historical significance. Historic buildings may require the requirements of this manual be waived and/or modified for attachment of overhead services, meter positions etc.

Similarly, flora protected by a Vegetation Protection Order may require special arrangements for the erection or alteration of overhead or underground services.

Electrical contractors should contact the *distributor* before starting work (See Exceptional Circumstances above).

1.8. Revisions and alterations

ENERGEX and *Ergon Energy* reserve the right to revise this publication. The current edition of this document is available on the *ENERGEX* website at www.energex.com.au or the *Ergon Energy* website at www.ergon.com.au.

1.9. Drawings

The drawings have been placed in the body of the document after the section to which they are most relevant. Drawings that are referred to in more than one section are shown as follows: Section 9, Drawing ECMM 9.2.

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2. *CUSTOMER'S* INSTALLATIONS

2.1. Request for Electrical Connection

An application for supply must be made to an electricity *retailer* licensed to operate in Queensland.

The *distributor* cannot energise a customer's installation unless:

(a) The *customer* has a retail sales contract (section 40D(f) of the *Electricity Act 1994*); and

(b) The *retailer* has then requested the *distributor* to connect the *customer* via a *SOR* transaction; and

(c) An *approved form* (Electrical Work Request (Form 2) - *ENERGEX* or Form A - *Ergon Energy*) has been submitted.

Where possible, and to hasten completion, the *customer* should provide the *National Metering Identifier* to the *retailer*.

2.1.1 Large Customers

A *large customer* who consumes 100MWh or more per annum and requires an initial connection by the *distributor* must also arrange for the metering to be installed by an accredited *metering provider*. They must also request their initial connection via their chosen *retailer*.

Notes for *Large Customers*:

1. Under section 30X of the *Electricity Regulation 2006*, any new connection associated with a *premises* that has an existing market contract must also be treated as a market *customer* for the purposes of metering and any right to access the Standard Large Customer Retail Contract at Notified Prices.
2. To enable the connection to be completed to schedule, a *customer* will be required to advise the *distributor* of their expected annual consumption.

2.2. Request for Initial Connection, Metering Change or Service Alterations

Electrical Contractors shall submit an *approved form* (Electrical Work Request (Form 2) - *ENERGEX* or Form A - *Ergon Energy*) when they:

(a) Require an initial supply at an installation.

(b) Complete work that requires additional metering or a change to existing metering.

(c) Require service alterations.

Note: In the *Ergon Energy* distribution area where Ergon Energy Queensland (EEQ) is the customer's retailer, it is not necessary for customers to contact the retailer to raise a *SOR* in relation to work associated with metering changes or service alterations and/or additions. (Refer to Clause 2.2(b) and (c), Clause 2.3 and Stakeholder Interaction Diagrams 3 to 6). Upon receipt of an approved form for such work, the *distributor* will raise a *SOR* on behalf of EEQ.

Where alterations to an installation are to be carried out, the *distributor* shall be advised of any of the following situations:

(a) Where the electricity service may be over or in the vicinity of a swimming pool or hazardous area as defined in AS/NZS 3000 (Wiring Rules);

(b) Any proposal for new or additions to, an existing HV installation (i.e. the *point of supply* and or the metering transformer may need upgrading).

For major changes or load increases the *customer,* or their *electrical contractor* or consultant, should contact the *distributor* at the earliest opportunity to obtain an estimate of the time that may be required to modify the network to accommodate the changes or load increases.

2.3. Alterations and Additions

The *electrical contractor* shall submit an *approved form* in adequate time for the modification to the *distributor's* service and or network to be completed before supply is required.

Where *customers* require alterations and/or additions to their electrical installation which involve:

(a) The installation of additional phase/s

(b) The relocation of the *point of supply*

(c) Any increase in loading that requires an increase in the capacity of the service or distribution network

(d) The installation of a service following repair works (e.g. repair works after storm damage)

Note: *Customer*s with a *NMI* classification - Large, are to provide the contact details of their *metering provider*.

2.4. Breaking of Metering Terminal Cover/Isolation Link Seals

In the interests of electrical safety and to ensure the integrity of metering and control equipment the *distributor* or the *metering provider* will seal this equipment.

Approval will be given for the terminal cover/metering isolation link seals only, to be removed by an *electrical contractor* provided notification is given to the *distributor* or the *metering provider* either before the removal of the seals or as soon as practicable after the event.

An *approved form* must be submitted to the *distributor*, and/or the *metering provider*, as soon as possible after metering alterations are completed. Where the meter cover has been damaged or alterations to the metering cable entry point allows contact with live parts, the *electrical contractor* shall leave the installation in a safe state (e.g. fill/cover holes with a suitable material) and submit an *approved form* that advises a new meter cover is required. Alterations to metering terminal covers are not permitted.

Approval must be obtained from the *metering provider* responsible for the metering installation for a *Large Market Customer* **PRIOR** to performing any changes that may affect the metering installation e.g. replacing the customer's switchboard. (Refer to Clause 6.9).

Note: For remotely read interval meter installations, the *customer* is to provide the contact details of their *metering provider*. The nominated *metering provider* is responsible to ensure the metering installation complies with the requirements of Chapter 7, of the *National Electricity Rules*.

2.5. Examination, Test and Connection

The *distributor's* electricity connection officer is required to examine and test the *consumer's mains* and main switchboard of an installation before the initial connection to supply.

The examination, test, and connection shall **not be regarded as implying compliance** with any specification and the *electrical contractor* remains responsible for the standard of the work, regardless of whether an officer from the *distributor* examines, or tests, the whole or part of the installation.

2.6. *Unmetered Supplies*

Unmetered supply may be available where the *distributor* considers it impractical to read or maintain metering equipment or where metering equipment would be susceptible to damage.

Approval must be obtained from the *distributor* prior to the installation of an *unmetered supply*. Where the *distributor* consents to an *unmetered supply* (e.g. telephone cabinet, bus shelter, traffic signals, etc.) the following general conditions will apply:

(a) Approval must be gained (as appropriate) from any relevant authority for equipment installed in the road reserve. (Refer to the *Electricity Regulation 2006*);

(b) The *distributor* must be advised prior to any changes to the loading of the installation;

(c) Unless specifically authorised socket outlets are not permitted;

(d) The installation shall consist of a small steady uniform load. (Refer to Clause 5.9(a) for installation of *consumer's mains* on the *distributor's* pole).

2.7. Identification in Multiple Installations

Each individually metered section of a multiple installation shall be clearly identifiable (e.g. shop, unit or factory number). The number shall be permanently marked on the main switchboard, distribution board (if applicable) and front door so that the *distributor* may install the required connection and metering for the installation. A site plan of the overall layout of the site shall also be permanently displayed on the inside door of the main switchboard.

2.8. Protective Fault Current Devices

Protective devices installed by the *customer* shall have an interrupting capacity adequate for the prospective short circuit current at the point of installation.

In the event of the fault current being increased at any point on an installation because of provisions for additional load, the *customer* shall be responsible for the upgrading of all equipment not rated for the prospective fault level.

Prospective fault level details may be obtained by contacting the *distributor*. (Refer to page 1 for contact details).

Notes:

1. The *distributor's* (HRC) low voltage service fuse rated up to 100A will provide suitable fault current limiting for a customer's installation.
2. For low voltage supplies the *distributor's* service fuse shall not be considered as overload protection for the *consumer's mains*.
3. Installation of fault current limiters may be required to protect *direct connected metering* on the customer's installation. (Refer to Clause 7.2).

Information on high fault currents can be found in the Electrical Safety Office - Code of Practice for Electrical Work and the Electrical Safety Office web site.

2.9. Power Factor

The *distributor* requires a *customer* to ensure that the power factor of any electrical installation measured at the *consumer's terminals* under normal load conditions is not less than 0.8 lagging as set out in the *Electricity Regulation 2006* for installations supplied at low voltage. The requirement of the *National Electricity Rules* Schedule 5.3 shall be followed for other connections. (Refer to TABLE 2.1).

Unless special arrangements are made to maintain the installation's power factor at not less than 0.8 all discharge lighting in excess of 240W total tube rating shall be corrected to 0.8 pf. Except by agreement with the *distributor* the power factor of any installation shall not be leading.

If the power factor falls outside these limits, the *customer* will be responsible for taking action to ensure compliance (as agreed with the *distributor*).

TABLE 2.1 provides the power factor performance standard.

TABLE 2.1

POWER FACTOR PERFORMANCE STANDARD	
Nominal Supply Voltage	**Power Factor Range**
50kV - 250kV	0.95 lagging to unity
1kV <50kV	0.90 lagging to 0.90 leading
<1kV*	>0.8 lagging but not leading
* *Electricity Regulation 2006*. At all other voltage ranges the requirements are as specified by the *National Electricity Rules*, unless detailed in a contract.	

Customers shall ensure that shunt capacitors installed for power factor correction are designed to avoid attenuating the *distributor's* audio-frequency signals used for load control. The *distributor* will supply the details of the audio-frequency signals in any region upon request. *Customers* are also required to meet the harmonic emission limits specified for their installation even under resonant conditions due to their capacitor bank.

2.10. Limitations on Starting Currents of AC Motors

2.10.1 General Requirements

Except as required by Clause 2.10.4 motor installations and any associated starting devices shall be so designed and operated as to comply with either of the following conditions:

Single Phase Motors 240 Volts and 480 Volts

TABLE 2.2

MOTOR VOLTAGE	MOTOR SIZE	ALLOWABLE STARTING CURRENT
240V	All Sizes	I = 45 Amps
480V	Not exceeding 7.5kW	I = (17.5 x k) Amps, where k is the continuous output rating (kW) of the motor.
	Exceeding 7.5kW	Shall not be connected.

Note: The *distributor* must be contacted before motors are installed in SWER areas of supply. (Refer to page 1 for contact details).

Three Phase Motors 415 Volts

TABLE 2.3

MOTOR SIZE	ALLOWABLE STARTING CURRENT
Not exceeding 1.5kW	I = 26 Amps
Exceeding 1.5kW and up to 3.75kW	I = (kW x 17.5) Amps
Exceeding 3.75kW and up to 10kW	I = (53 + 3.3 x k) Amps, where k is the continuous rating, (kW) of the largest motor in the installation.
Exceeding 10kW	Contact Distributor.

Exception:

1. No limitation may be placed on the starting current of any motor that is not frequently started and the rated output does not exceed 10% of the total motor load connected for a *customer* to the one service.
2. In *premises* which are supplied directly from a substation or in other appropriate supply conditions as determined by the *distributor*, starting currents in excess of those laid down may be permitted provided that written approval is obtained from the *distributor*. (Refer to page 1 for contact details).

Note: Motors should not be started simultaneously and the starting current of the motors should be limited to 2 to 3 times full rated current by fitting with an appropriate starter.

2.10.2 Fall in Voltage

The starting current shall not cause a fall in Voltage of more than 5% of the nominal voltage at the *point of supply* for more than 0.02 seconds when connected to a typical 415/240V, 3 phase, 50Hz supply system which for this purpose shall be considered to have the following impedance:

Z = 0.2 + j0.2 ohms (phase - neutral);

Z = 0.1 + j0.1 ohms (line impedance per phase).

2.10.3 Test Methods

(a) Fall in Voltage shall be measured by instrumentation with a high-speed measurement capability.

(b) Starting currents shall be measured by instrumentation with a high-speed measurement capability or by the locked rotor method, with the rated voltage and frequency applied to the terminals of the motor.

(c) In any case where the test methods specified in paragraphs (a) and (b) above cannot conveniently be applied, another test method that conforms to recognised practices in the electrical industry may be used.

Note: The *distributor* will accept test results from a recognised testing laboratory or manufacturer's certified test results.

2.10.4 Special Provisions

For both three phase and single phase motors the *distributor* may require maximum starting currents lower than those set out or may limit the rating of any motor to be connected if such lower starting currents or limits of motor capacity are necessary to prevent interference with supply to other *customers*.

For isolated generation areas within the *Ergon Energy* distribution area, special limitations may be applied on starting currents of electric motors (including air conditioners) and also may require time delay controls on motor starting circuits after a power outage. Any special requirements are outlined in the *Ergon Energy* document PW000202R114 - "Guidelines for Electrical Installations at Isolated Systems" which is available on request by contacting *Ergon Energy* Customer Service. (Refer to page 1 for contact details).

2.11. Interference with Supply of Electricity to Other *Customers*

*Customer*s shall take reasonable precautions to prevent transformer arc welding machines, motor starting, fluorescent lighting and any other equipment from interfering with the satisfactory operation of computers, telephone systems etc.

The requirements of AS/NZS 61000 series standards "Electromagnetic Compatibility (EMC)" shall be observed at all times.

The fact that the *distributor* may have connected the apparatus or equipment causing the interference shall not exempt the *customer* from this requirement. Also see Clauses 4.2 to 4.6.

Note: *Customers* with an electrical installation or equipment which may be sensitive to voltage variation, transients, loss of one or more phases of supply or due to leakage current are advised to install protective equipment to limit possible damage.

2.12. High Voltage Installations

Any person intending to install high voltage equipment at a *premises* shall consult the *distributor* before taking steps to obtain or install such equipment.

Where the *distributor* agrees, subject to certain conditions, (such as a minimum demand being met), with a *customer's* request for a high voltage connection, the agreed voltage is the standard voltage for the supply. (Refer to the *Electricity Regulation 2006* for standard voltages). The *distributor* will provide a letter of offer or connection agreement.

The *Electrical Safety Act 2002* requires all new or altered high voltage electrical installations to be inspected by an *Accredited Auditor* before connection to supply. For additional information on *Accredited Auditors* contact the Electrical Safety Office. The auditor should be involved in the project at an early stage.

2.12.1 General Requirements

The *customer* is required to supply, install and maintain all electrical equipment supplied by the *customer*. All high voltage equipment must be compatible with the *distributor's* supply. Relays, current transformers and other protective equipment must have characteristics compatible with the *distributor's* existing protective system.

The design, construction and installation of all high voltage equipment shall comply with the appropriate Australian Standards (e.g. AS/NZS 3000 (Wiring Rules) and AS 2067) or other equivalent Standards (e.g. IEC Standards). Plans, drawings and particulars describing the proposed installation and its operating conditions shall be provided. For *high voltage metering* arrangements refer to Section 11 of the *ECMM*.

The *distributor* will advise the *customer* of the prospective fault level and the normal fluctuations of supply voltage for which provisions should be made.

2.12.2 Testing Requirements

The *customer* shall meet the cost of any high voltage testing as required by AS 2067 and auditing in accordance with the *Electrical Safety Act 2002*.

The *responsible person* shall ensure that high voltage revenue metering instrument transformers are tested and maintained in accordance with the *National Electricity Rules*.

2.12.3 Operation of High Voltage Equipment

The *customer* is responsible for ensuring that the high voltage installation is operated in accordance with the requirements of the *Electrical Safety Act 2002, the Electrical Safety Regulation 2002* and the *Code of Practice for Electrical Work*.

The *customer* has an obligation to ensure all persons who are involved in the high voltage isolation and access procedures have been trained and assessed as competent to perform the roles for which they are responsible.

Testing, earthing and safety equipment suitable for operation of the high voltage equipment shall be readily available on site.

For high voltage installations consisting of more than one item of switchgear, an operating diagram in the form of a single line schematic of the complete installation is to be permanently displayed adjacent to the main switch or switches.

Where items of switchgear are remote from the main switchboard, it is recommended that the operating diagram also be permanently displayed at these locations.

2.12.4 Maintenance and Repairs of High Voltage Equipment

A *customer* who takes supply at high voltage shall ensure that the high voltage installation is maintained so that any malfunction will not create a hazard or cause interference to the *distributor's* supply.

All costs associated with the maintenance or repairs of the customer's high voltage installation shall be met by the *customer*.

Note: The *customer* must be prepared for power interruptions during high voltage testing procedures, maintenance or repairs.

2.12.5 Conversion from Low Voltage Supply to High Voltage Supply

A *customer* planning to convert from supply at low voltage to supply at high voltage shall negotiate with the *distributor* before commencement of work.

Options to be considered may include the following:

(a) Replacement of the *distributor's* substation and other assets or purchase of this equipment from the *distributor*; and

(b) Any costs associated with converting the installation for compliance with AS/NZS 3000 (Wiring Rules) and AS 2067.

2.13. *Customer*'s Generating Plant

2.13.1 General

The installation of *customer's* generating plant shall comply with AS/NZS 3000 (Wiring Rules). The *consumer's mains* neutral shall not be switched or broken on the distribution supply side of the MEN connection. The Generator neutral is required to be clearly identified at the main neutral link.

2.13.2 Non-Parallel Operation with Distributors' Supply

***Customer*'s generating plant for emergency supply**

This section applies for the installation of generating plant on a *customer's premises* to provide a supply of electricity to the *customer's* electrical installation, during an interruption of the supply of electricity.

(a) The *customer* shall ensure that, when the plant is operating to give emergency supply, it is installed with effective isolation between—

(i) all active conductors of the part of the electrical installation or electrical installations to which the plant is connected; and

(ii) the part of the electrical installation still connected to the supply from the *distributor*.

(b) The connection of the plant shall be so arranged that the *metering provider's* revenue meters do not meter the alternate supply.

2.13.3 Parallel Operation with Distributor's Supply (Co-Generation)

***Customer*'s generating plant for interconnection to supply network**

(a) A *customer* shall not install generating plant for interconnection with the *distributor's* supply network without prior agreement.

(b) The agreement shall include the conditions for securing safe and stable parallel operation of the supply network and the generating plant.

Note: Co-generation is allowable from all forms of alternative energy supplies such as solar panel (photovoltaic), wind turbine, diesel generation etc.

Refer to Section 10 for details of the metering schemes for interconnection of inverter energy systems (*IES*) connected to the distribution network.

For generation units other than *IES*, the *customer* shall contact the *distributor* or the *metering provider* for specific connection requirements. Appropriate revenue metering will be installed in accordance with the negotiated supply arrangements.

2.14. Determination of Maximum Demand

Unless limited by a fixed setting circuit breaker, the determination of the maximum demand of an installation shall be calculated, measured or assessed in accordance with the guidelines given in Appendix C of AS/NZS 3000 (Wiring Rules).

2.15. Requirement for Circuit Breakers in Rural/Isolated Areas

The *distributor* requires circuit breaker/s for main switch/s as part of the customer's installation and these circuit breaker/s are required to coordinate with the service fuse/circuit breaker. The *distributor* may require the customer's protective device to be changed or altered to provide adequate discrimination. *Electricity Regulation 2006, sections 29 and 30.*

Notes:

1. These regulations refer to the *customer* owned circuit breaker main switch/s provided as part of the customer's installation and not to the customer's sub-circuit protection or the *distributor's* service fuse/circuit breaker.
2. Refer to Glossary of Terms for definition of *rural/isolated area*.

3. DETERMINATION OF THE NUMBER OF PHASES TO BE INSTALLED

3.1. General

The number of phases provided to supply load at an installation shall be the number required by Section 4 for individual apparatus or the number determined by this section, whichever is the greater.

Note: The *electrical contractor* or designer should consult with the *customer* to determine future loading requirements. Provision for additional phases or larger *consumer's mains* may be required (e.g. air conditioning load).

3.2. Urban Areas

3.2.1 Single Customer Installations

Other than where multi-phase appliances are installed on the *premises*, if the maximum demand as calculated in accordance with AS/NZS 3000 (Wiring Rules) is:

(a) not greater than 70A, then supply shall be one phase and neutral;

(b) between 70 and 140A, then supply shall be two phases and neutral;

(c) greater than 140A, then supply shall be three phases and neutral.

The *distributor* approves the use of 3 phase underground or overhead supply where 3 phase load (e.g. air conditioner or pump) is connected and the remainder of the installation is balanced across the 3 phases.

3.2.2 Multi Customer Installations

Other than where multi-phase appliances are installed on the *premises* the number of phases shall be determined by the following methods:

(a) A maximum of two individually metered units may be connected to a single phase supply if the maximum demand calculated in accordance with AS/NZS 3000 (Wiring Rules); Appendix C, TABLE C1, Column 3, does not exceed 70A.

(b) Where there are more than two individually metered units, the installation shall be arranged for a three phase supply (e.g. three units - one per phase) unless otherwise advised by the *distributor*.

Note: Separate services and meter positions shall be installed for a duplex (two units divided by a common wall) where each portion has a separate (freehold) title. (Refer also to Clause 7.8.5 for Community Title Scheme arrangements).

3.3. Non-Urban Areas

In non-urban areas connection of additional phases to the customer's electrical installation may be necessary even though not required under the guidelines given in Clause 3.2.

Notes:

1. Where single phase 11kV only is available the maximum demand may be increased up to 100A depending on the capacity of the local transformer and supporting high voltage infrastructure.
2. Load limitations may apply for single wire earth return (SWER) systems.

For electrical installations in these areas *electrical contractor*s should consult the *distributor*. (Refer to page 1 for contact details).

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4. BALANCING OF LOAD AND LIMITATION ON EQUIPMENT

4.1. General

The load of an installation, or separately metered portion of an installation supplied by separate *consumer's mains* or submains, shall be so balanced that at the time of maximum demand on such installation or portion of such installation the current in any phase does not exceed the current in any other phase by more than 20A or 20% whichever is the greater (unless otherwise approved in writing by the *distributor*).

The *distributor* may apply additional conditions when large loads are connected in rural (non urban) areas.

4.2. Connection of Equipment - Current Limitations

Equipment (not specified elsewhere in this part, or a lighting installation or a sign) designed to operate at 240V and whose rating is:

(a) Not greater than 25A will be connected between one phase and neutral.

(i) In exceptional circumstances the *distributor* may approve the connection of single phase appliances rated at more than 25A; and

(ii) In multiphase electrical installations the equipment may, with the approval of the *distributor*, be connected to more than one phase and neutral provided the load of the installation is to be balanced across the supply phases.

(b) Greater than 25A, but not greater than 50A, shall be connected between two phases and neutral, except that in multiphase electrical installations the equipment may, with the approval of the *distributor* be connected to more than two phases and neutral.

(c) Greater than 50A, shall be connected to three phases and neutral.

4.2.1 Domestic Ranges

Urban Areas

Where an individually metered installation includes a cooking range or ranges, a total rating not exceeding 13kW may be connected to one phase and neutral.

If the total rating exceeds 13kW then:

(a) For one range it shall be connected to at least two phases and neutral; or

(b) For two or more ranges each range may be connected to one phase and neutral of a multiphase supply.

Non-Urban Areas

Where in accordance with Clause 3.2 an electrical installation is required to be connected to either two phase and neutral, or three phase and neutral, all ranges should be balanced over the number of phases connected.

4.2.2 Commercial Cooking Appliances

Any such appliance, whose total rating at 240V is:

(a) Not greater than 35A, shall be connected to one phase and neutral; or

(b) Greater than 35A, shall be connected to a minimum of two phases and neutral.

4.2.3 Water Heaters

(a) The rated current of an instantaneous water heater shall not exceed 20A per phase, unless otherwise approved in writing by the *distributor*.

(b) For the suitability of water heaters for controlled or night rate supplies reference should be made to the Queensland Government “Tariff Gazette” (i.e. where the heating unit rating exceeds 1800W, it shall not exceed 13.5W per litre of heat storage volume for heat exchange type water heaters or 15.5W per litre of rated hot water delivery for other storage type water heaters).

4.2.4 Kilns in Domestic Installations

A kiln, which has a total rating not exceeding 30A, shall be connected to one phase and neutral in domestic installations.

A kiln with a total rating exceeding 30A shall be connected to two or more phases and balanced over the number of phases connected to the installation.

4.3. Equipment Having Fluctuating Loads.

Examples of equipment having fluctuating loads are: Welding Machines, X-Ray equipment, furnaces etc.

The *distributor* reserves the right to specify the conditions under which an electricity supply will be given for equipment having rapidly fluctuating loads such as welding machines (other than welding machines complying with AS 60974.1, or previous standards superseded by this standard, and marked "Limited Input"), X-ray equipment and furnaces.

No work should be carried out by a *customer* until advice has been received on the terms on which supply will be given. (Refer to Clause 2.11 "Interference with Supply of Electricity to Other *Customers*").

4.4. Harmonic Interference or Wave Form Distortion

The *distributor* reserves the right to specify the conditions under which an electricity supply will be given for equipment which would cause excessive distortion to the wave form of the supply system voltage. (e.g. rectifiers, frequency converters, load control devices using thyristors or saturable reactors).

4.5. Rectifiers

Alternating to direct current rectifying equipment shall not be connected to the *distributor’s* system unless:

(a) The rectifier is of the full-wave type; or

(b) A double-wound transformer is interposed between the rectifier and the supply system; or

(c) The rectifier is used in conjunction with an electrical measuring instrument or in similar applications where the rectified current does not exceed 100mA.

Note: Further information regarding general limits may be obtained from AS/NZS 61000 series "Electromagnetic Compatibility (EMC)".

Additional limits apply to avoid harmonic interference to the *distributor’s* audio frequency load control system. (Refer to Clause 2.9).

4.6. Connection of Equipment - Voltage Limitations

All equipment must be able to operate satisfactorily within the voltage limits detailed in the current Queensland Electricity Legislation.

4.7. Connection of Equipment - Isolated Generation Localities

Load restrictions on electric motors, welders, air conditioners and other electrical equipment in excess of 2.4kW may apply in isolated remote generation areas throughout *Ergon Energy*. Call Customer Service (refer page 1) to clarify any restrictions contained in *Ergon Energy* document PW000202R114 - "Guidelines for Electrical Installations at Isolated Systems".

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5. *SERVICE LINES* AND *POINT OF SUPPLY*

5.1. General

Each individual electrical installation (as defined in AS/NZS 3000 (Wiring Rules)) shall have a separate and individual connection to the supply network (i.e. Separate *point of supply* - *service line*, *point of attachment*, *consumer's mains* etc).

Note: The *distributor* will not accept any "Joint Use" arrangements where two or more *customers* share the same property pole and/or property line and/or overhead service (e.g. small lot subdivisions).

5.2. *Point of Supply* (Consumer's Terminals)

Unless otherwise determined or approved by the *distributor*, the *point of supply* shall be located as detailed in Clauses 5.2.1 and 5.2.2.

5.2.1 Low Voltage

The point of supply shall be located -

(a) at the termination of the overhead *service line* onto a building or structure where the *service line* is installed without the use of property poles (i.e. typically the first span of *service line* to the first structure); or

(b) on the first property pole (termination pole) from the point of origin of the *service line* where supply is connected by means of a property line.

Unless otherwise approved by the *distributor*, the termination pole shall not be located more than 20m from the property boundary. Where the *service line* does not cross a property boundary the first property pole shall not be located more than 20m from the origin of the *service line*.

In the case where the *service line* crosses a road reserve and extends into private property, the total length of the *service line* from the *distributor's* supply pole to the first property pole shall not exceed 50m; or

Note: To comply with this requirement, the distance that the first property pole is located within the property may need to be reduced so that the 50m limit of the *service line* is not exceeded (in special situations the service length may be increased at the discretion of the *distributor*).

(c) in a service pillar or pit at the *customer's* property boundary in underground residential distribution areas and non - CBD commercial and industrial areas; or

(d) at the termination of the underground *service line* on the *customer's premises*. This arrangement is generally restricted to the CBD; or

(e) at the low voltage terminals of a distribution transformer installed at the *customer's premises* or at the load terminals of any switch or circuit protective device that may be installed by the *distributor* at such transformer. (Refer to Clause 5.10 "Substations on *Customer's Premises*").

5.2.2 High Voltage

The *point of supply* shall be located -

(a) at the load terminals of the metering unit; or

(b) at the cable box terminals of the high voltage switchgear; or

(c) at the cable box terminals of high voltage switchgear with internal metering; or

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(d) as determined by the *distributor*.

(Refer to Clause 11.5).

5.3. *Service Lines*

5.3.1 Working on or near the Distributor's Assets

It is the responsibility of the *electrical contractor* to obtain permission to work on or near the *distributor's* assets. (*Electrical Safety Regulation 2002*). Examples where authorisation is required include, work on or near the *point of attachment*, accessing standard underground pillars or work at the low voltage end of a distribution transformer. Information on the requirements for becoming an authorised person can be obtained from the *distributor's* call centre. (Refer to page 1 for contact details).

5.3.2 General

Unless otherwise advised, the *distributor* will provide either an overhead *service line* or an underground *point of supply* (typically an underground service pillar). For further details on each *service line* type refer to Clauses 5.4 and 5.5.

For *service lines* in general:

(a) A charge may be made by the *distributor* for the installation and removal of a temporary *service line*.

(b) A charge may be made by the *distributor* for any additional *service line* or additional phases for hobby or other purposes.

(c) Where a *customer* requests that a type of *service line*, other than that proposed by the *distributor*, be installed and the *distributor* agrees to install such type of *service line*, the *customer* may be required to pay additional costs.

(d) Where a *customer* requests that an existing *service line* be altered, and the *distributor* agrees to make such alteration, the *customer* may be required to pay all costs.

(e) Where the *customer* requests an alternate point of origin for a *service line*, a capital contribution will be required for any extension of the *distributor's* mains.

(f) The *customer* shall ensure sufficient clear unobstructed access to, around, and below the *point of attachment* and *point of supply* to allow the *distributor* to safely maintain the service. Note requirements of Clause 5.4 below.

(g) The *customer* via their *electrical contractor* is required to provide the means of connection for either an underground or overhead connection, e.g. a *suitable mains connection box* or suitably sized enclosure with insulating shrouds to suit, complete with 12mm stainless steel bolts, nuts, washers and spring washers. The *electrical contractor* shall lug the conductors. Where aluminium cable is used for underground *consumer's mains*, cable ends are required to be terminated with suitable bi-metallic connectors, for connection to fuses and neutral link.

5.4. Overhead *Service Lines*

The *distributor* shall determine the point of origin, the route, the *point of attachment* and the facilities required for the attachment and connection of the *service line*. The *customer* or their *electrical contractor* shall consult the *distributor* prior to planning the installation. (Refer to service clearance details in Drawings ECMM 5.1 and 5.2).

Only a person authorised by the *distributor*, shall install and connect an overhead *service line* to the *customer's* installation.

The *distributor* will not erect or connect a *service line* that crosses an adjacent property or *premises*.

The *distributor* shall determine the type of overhead *service line* and shall supply, install and maintain the *service line* at its own cost (the *service line* will be installed from the *distributor's* works to the *point of supply*), except that:

(a) Where the *distributor* has agreed to an overhead *service line* in excess of 20m (either low or high voltage) the *customer* may be charged for all costs of the length of *service line* in excess of 20m. This distance is measured from the point where it crosses the *customer's* property alignment, or where such *service line* does not cross the property alignment, in excess of 20m from the point of origin of the *service line*.

(b) All poles or other structures on the *customer's premises* for the attachment of an overhead *service line* and overhead *consumer's mains* shall be provided and maintained by the *customer*.

(c) The *distributor* will not erect an overhead *service line* over a swimming pool, spa or hazardous area.

(d) A *customer* shall provide suitable facilities on their *premises*, acceptable to the *distributor* for the attachment and connection of a *service line*. This may require the *customer* to install a property pole.

(e) 'J' Hooks are not permitted on fascias or poles. For 1kN services a minimum M12 open eye screw or eye bolt is acceptable. For other services up to 3.5kN a minimum M16 eye bolt is required

(f) A *customer* must ensure that the route for a new overhead *service line* is cleared of trees and other flora that may contact the line and that the line clearances remain unaffected by subsequent works on the *premises*. (e.g. building alterations, land fill, driveways, trafficable areas, changes in landscape etc).

In the ENERGEX distribution area, a flying fox service connection may be available in exceptional circumstances. Prior approval for a flying fox service arrangement is essential, the *distributor* will not approve any flying fox arrangement without prior consultation. Where the *distributor* has agreed to a flying fox service arrangement, the full costs of the arrangement is payable by the *customer* including any network alterations that may be required.

Note: Details of overhead services line clearances are shown in Drawings ECMM 5.1 and 5.2.

5.4.1 Cross Road Service Poles

The distributor shall only install cross road service poles:

(a) Where required to maintain statutory clearances across the roadway; and

(b) Where no property pole would be required if the *distributor's* mains poles were erected on the same side of the road as the property (consultation with the *distributor* required).

5.4.2 Property Poles

(a) Precautions must be taken to prevent both internal and external corrosion in steel property poles. Due to the difficulties of assessing the extent of internal corrosion of steel in ground poles a rag bolt assembly is the recommended type where a steel pole is used for the first property pole. (Refer to Drawings ECMM 5.3, 5.4-1 and 5.4-2).

For Builder's Temporary Supply (BTS), where a steel reusable pole is used, refer to Drawings ECMM 5.5, 5.6-1 and 5.6-2 for details of an approved design. The connection of the overhead *service line* can be facilitated with the use of a mains connection box suitable for copper conductors.

(b) Hardwood timber property poles are to be suitably treated and have a minimum SWL rating of 5kN (as indicated on the pole disc). Other types of property poles are acceptable provided they meet the requirements of AS/NZS 3000 (Wiring Rules) Appendix D.

> Within the *Ergon Energy* distribution area it is required that all customer property poles be a minimum of 5.0m out of the ground.

5.4.3 Overhead Service Line Attachments

(a) Standard service cables used are XLPE insulated aluminium in sizes 25mm², 35mm² (*ENERGEX* only), 50mm² (*Ergon Energy* only) and 95mm². For installations with higher load requirements, these service sizes may be connected in parallel. A 6mm^2 copper *service line* may be used for small *unmetered supplies* such as telephone cabinets etc.

***ENERGEX* Distribution Area**

> Within the *ENERGEX* distribution area overhead *service line* attachments shall have a working load of 1kN.

***Ergon Energy* Distribution Area**

> Due to the network design criteria required for the more regular occurrence of high wind, high temperature or cyclonic conditions within the *Ergon Energy* distribution area the following safe working loads (SWL) apply:
>
> (i) Attachments for 25mm² overhead *service lines* shall have a load rating of 1kN working load. (Refer to Drawing ECMM 5.7).
>
> (ii) 50 and 95mm² services shall have a load rating of 3.5kN working load and parallel (twin) 95mm^2 overhead *service lines* shall have a load rating of 7kN working load. Safe working loads shall be determined by applying a factor of 2 to failing loads.
>
> For overhead *service lines* requiring a 3.5kN design for the eye bolt, raiser bracket or service pole, (other than hardwood timber which requires 5kN), the customer must provide certification from a suitably qualified person (i.e. a RPEQ) that the structure is suitable for the application. (Refer to Drawing ECMM 5.10).

(b) The method of attachment of an overhead *service line* to a structure shall be such that mechanical load is transmitted to the frame of the structure. Details of approved attachment details for 1kN and 3.5kN service attachments are contained in Drawings ECMM 5.7; 5.8; 5.9 and 5.10.

(c) Where any electric line or electrical article of a *customers* electrical installation is to be supported by any structure, other than a wooden or steel pole conforming to the requirements of AS/NZS 3000 (Wiring Rules), the *customer*

must provide certification from a suitably qualified person (i.e. an *RPEQ*) that the structure is suitable for the application.

(d) The maximum height of the *point of attachment* of any overhead *service line* on a customer's *premises* shall not exceed 8m above ground or floor level and shall have ready and safe access by ladder. This maximum height may only be exceeded in special situations where the *distributor* has approved the arrangement, and given this approval in writing.

(e) Where raiser brackets or eyebolts are used, the design and installation is to make provision for work to be carried out safely. (Refer to the Workplace Health and Safety Legislation).

5.4.4 Raiser Brackets

Proprietary raiser brackets for straight pull not exceeding 1.5m in height, or for side pull not exceeding 1.2m in height, certified by an *RPEQ*, tested to a suitable SWL (e.g. 1kN or 3.5kN minimum rating for raiser brackets), and approved by *ENERGEX* or *Ergon Energy* are deemed suitable.

Notes:

1. Within the *Ergon Energy* distribution area, the maximum size overhead *service line* that will be erected to 1kN rated brackets is 3 phase 25mm^2. (Refer to Clause 5.4.3(a) for 3.5kN bracket requirements).
2. Refer to Drawings ECMM 5.7 and 5.8 for examples of acceptable service raiser bracket designs i.e. brackets that display an SWL and are fitted with a means of attachment that will retain the service in high wind conditions (e.g. a pigtail or closed loop).
3. Where timber is used as an anchorage for 1kN raiser brackets and eye bolts it is to be a minimum of 100mm X 75mm and securely fastened to or part of the building structural frame. (A bracket mounted on a fascia without suitable bracing to the structural frame is not considered to be an effective method).
4. Through roof mounted service raiser brackets shall be positioned no further than 0.5m back from the edge of the roof or guttering.
5. All service raiser brackets shall be positioned so that any backstay attached to the roof is in line with the direction of the service pull +/- 20 degrees.
6. Where an approved side pull type service raiser bracket is installed, and the angle of the *service line* from the *point of attachment* to the *point of supply* exceeds 60 degrees or is greater than that recommended by the manufacture, a service raiser bracket designed for this application shall be installed. The height of this bracket shall not exceed 1.2m.

5.4.5 Point of Supply Overhead Service Lines

(a) The *point of supply* shall be no more than 600mm from the *point of attachment*.

(b) The *point of attachment* and the *point of supply* are to be positioned on the building or structure where the *distributor's* personnel have unobstructed ready and safe access. That is, it must be positioned where personnel do not climb on roofs, enter adjoining properties, or carry ladders through structures, and or buildings for access.

(c) Clear level and safe access to the *point of attachment* shall be maintained by the *customer* to allow the *distributor* to maintain the service. A clear level area below the *point of attachment* that allows a ladder ratio of 4:1 vertical to horizontal is deemed suitable.

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5.4.6 Connection Arrangements at Point of Supply

(a) A *suitable mains connection box*, complete with house service connectors, shall be provided by the *customer* for the connection of overhead *service lines* to *consumer's mains*.

(b) *Suitable mains connection boxes* shall be mounted to provide adequate support by brackets or similar and not be reliant on rigid conduit for support. (Refer to Drawings ECMM 5.7; 5.8; 5.9 and 5.10).

Exception: The requirement for a *suitable mains connection box* or UV enclosure is waived where the *distributor's service line* is terminated onto aerial overhead *consumer's mains*.

(c) If *consumer's mains* are replaced or upgraded on an existing installation, a *suitable mains connection box* or an insulated enclosure shall be installed to the same standard as for a new service.

(d) Where an overhead *service line* is to be connected to overhead *consumer's mains*, clamps suitable for this application shall be provided. This does not apply where parallel overhead *service lines* or parallel *consumer's mains* are installed.

(e) Where the conductors of either the *service line* or *consumer's mains* are of a size not suitable for a *suitable mains connection box*, the method of connection shall be such that the *consumer's mains* are terminated with cable lugs within a UV resistant insulated enclosure. (Refer to Note 1 below and to Drawings ECMM 5.8; 5.9 and 5.10).

(f) The *customer* (via their *electrical contractor*) is required to provide components for the connection of the *consumer's mains* to the *distributor's service line* as detailed below:

(i) A *suitable mains connection box*; or

(ii) An approved UV resistant insulated enclosure and crimp lugs complete with shroud, 12mm stainless steel bolts, nuts, washers and spring washers fitted onto the *consumer's mains*.

TABLE 5.1 below gives the suitable sizes of UV resistant insulated enclosures:

TABLE 5.1

UV RESISTANT INSULATED ENCLOSURE	
Service Type	**PVC Enclosure Size**
Single 35 or 50mm² LV ABC service	360mm X 270mm X 220mm *
Single & Parallel (Twin) 95mm² LV ABC service	540mm X 360mm X 220mm

* Certain manufacturers utilise a spacer to achieve the 220mm depth.

Notes:

1. *Suitable mains connection boxes* are available for conductors up to 95mm^2. Where double insulated sheathed cables are used for the *consumer's mains*, the

sheathing must be removed in accordance with the manufacturer's instructions before termination into the IPC connector.

2. Refer to Clause 7.18 for phase identification requirements.

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3. It is recommended that these enclosures be mounted vertically with entry of *consumer's mains* positioned low, through the bottom of the enclosure.

4. For a builder's temporary supply (BTS), that utilises a reusable steel pole, the connection of the overhead *service line* can be facilitated with the use of a suitable mains connection box. Refer to Drawings ECMM 5.5; 5.6-1 and 5.6-2 for details of steel BTS poles design. All BTS must be metered.

5.5. Underground *Service Lines*

The *distributor* shall determine the point of origin, the route and the *point of entry* of the *service line*. The *customer* or *electrical contractor* shall consult the *distributor* prior to planning the installation.

For underground *service lines*:

(a) Where supply is by either a low voltage or a high voltage underground *service line*, the *customer* shall be charged all costs for the length of *service line* in excess of 7m from the point -

(i) where it crosses the *customer's* property alignment; or,

(ii) where such *service line* does not cross the property alignment in excess of 7m from the point of origin of the *service line*, except as provided for in Clause 5.2.1(c).

(b) Where required by the *distributor* for commercial or industrial installations, *customers* shall provide suitable facilities on their *premises* for the entrance, support, protection and termination of an underground *service line*. (Refer to the *ENERGEX* Commercial and Industrial Substation Manual for details or the *Ergon Energy* Indoor Distribution Substation Design Standard).

5.5.1 Underground Pit Systems

In areas where an underground pit system has been installed (e.g. In the *ENERGEX* distribution area at Northlakes, Inala and Runaway Bay and at various locations in the *Ergon Energy* distribution area) special requirements apply to the installation/upgrade of the *consumer mains*. (Contact the relevant *distributor* for details).

5.5.2 Underground Services in Overhead Areas

Where a *customer* in an overhead service area requests the installation of an underground service, and the *distributor* agrees to the request, supply shall be taken from a service pillar or pit installed on the footpath in line with the side property boundary. This service pillar or pit will be available to provide future underground supply to the adjoining property if required. Full recovery of costs for the additional assets will apply. A typical arrangement for an underground LV service pillar is shown in FIGURE 5.1.

5.5.3 Underground Service Pillars

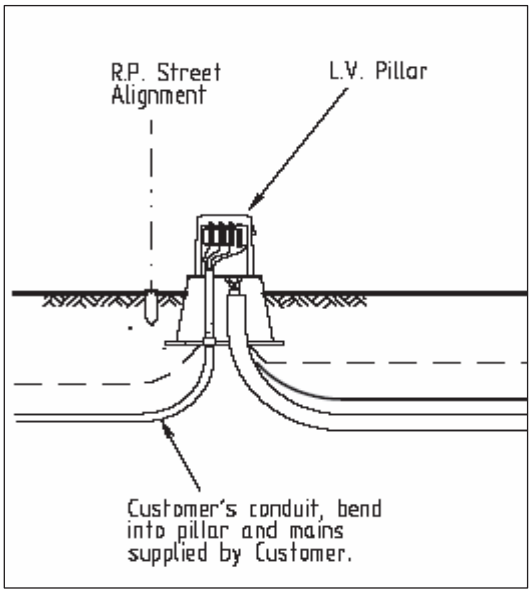
It is the responsibility of the *electrical contractor* to install the *consumer's mains* and conduit into the service pillar for termination by the *distributor's* personnel. (Refer to Clause 5.3.1 for access details). FIGURE 5.1 shows a typical LV service pillar arrangement.

The route of the *consumer's mains* is to be identified in accordance with AS/NZS 3000 (Wiring Rules).

Note: To prevent damage to the distributors service fuse, the conduit shall not protrude past the pillar base and shall be positioned to the rear of the fuse

panel The minimum length of the *consumer's mains* shall be sufficient to reach the top of the fuse panel +300mm.

FIGURE 5.1



5.6. Additional *Service Lines* in Urban Areas

The *distributor* shall install only one *service line* to supply one building or group of buildings occupied by one *customer* on one property.

Exception: Where two or more *customers* occupy one property, supply by more than one *service line* shall be at the discretion of the *distributor*.

Where the *distributor* agrees to install an additional *service line*, the *customer* may be required to pay all costs of the second *service line*.

5.7. Additional *Service Lines* in Non-Urban Areas

In non-urban areas, more than one *service line* may be provided free of cost to a *customer*, except as specified in Clause 5.3.2, provided that:

(a) The second *service line* is a considerable distance (e.g. more than 200m) from the first *service line* measured along the customer's property alignment and the load to be supplied is a considerable distance (e.g. more than 100m) from any building supplied by the first *service line*;

(b) In the opinion, and at the discretion of the *distributor*, it is more practical to supply the load on the property through more than one *service line*.

5.8. Alterations to *Service Lines*

Any alteration to a *service line* shall only be made by a person authorised by the *distributor*. The *customer* may be required to pay all costs of a *service line* alteration, unless the alteration is required for the *distributor's* purposes.

Before commencing building alterations or the erection of structures in proximity to *service lines*, the *customer* or *customer's* representative shall contact the *distributor* to ensure electrical safety is not compromised. (Refer to page 1 for contact details).

5.9. *Consumer's mains* on the *Distributor's* Poles

In general, *consumer's mains* shall not be installed on the *distributor's* poles. However, approval at the discretion of the *distributor* may be given under the conditions set out in part (a) and (b) below:

(a) Unmetered Installations

Unmetered installations are generally owned by a telecommunications company or public body (or affiliated operator) and installed on public land. (Refer to Clause 2.6).

When the installation does not meet the requirements of an *unmetered supply* (e.g. council public parks) it will be treated as a metered installation.

In no case shall the maximum demand of these installations exceed the rating of a standard overhead service (i.e. 100A per phase). This arrangement generally applies only to Rate 3 Public Lighting where a standard charge per light applies.

Where the above has been satisfied, approval may be granted for the public body (or affiliated operator) to install the *consumer's mains* on poles designated by the *distributor*.

Note: Specific requirements apply (particular poles types are unsuitable). The *customer* must contact the *distributor* for details and approval.

(b) Metered Installations:

In all cases this arrangement is totally at the discretion of the *distributor* and the following criteria must be satisfied:

(i) The supply network is within the boundaries of the *customer's* property; and

(ii) The installation actual demand is above 400A (i.e. in excess of a standard overhead service arrangement); or

(iii) The electrical installation is owned by a Public Body and complies with the following -

- the installation is for the use of the general public; and
- the public body is able to demonstrate that there is a community benefit in not installing a property pole (e.g. supply to parkland etc.); and
- the *distributor's* network is within a reasonable distance from the *point of supply* (i.e. not more than 20m); and
- the network is on the same side of the road as the installation; and
- the installation maximum demand is not greater than 100A per phase.

Note: Special conditions apply for all the above and approval, as well as the details of the requirements, must be obtained from the *distributor* prior to the commencement of any design or installation work. The *customer* shall meet all associated costs.

5.10. Substations on *Customer's Premises*

Where the aggregate maximum demand exceeds or is reasonably estimated to exceed 100kVA as determined by AS/NZS 3000 (Wiring Rules), the *distributor* may require a *customer* to provide free of charge the space necessary for a substation in accordance with the *Electricity Regulation 2006*.

5.10.1 Consumer's Mains Connections to Transformer Terminals

Where *consumer's mains* originate at the terminals of a transformer, they shall be adequately supported and shall be connected to the transformer terminals by flexible braid connectors and adaptor plates.

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The *electrical contractor* is responsible for the supply and installation of the low *voltage support stand/terminal cover, flexible braid connectors, adaptor plates and consumer's mains*, plus any equipment required by the *distributor's* Commercial and Industrial Substation Manual. (Refer to page 1 for details).

5.10.2 Multiple Transformers

Where multiple transformers supply a single switchboard each transformer must be connected to a separate bus section, however, a bus-tie switching arrangement is permitted provided:

(a) The bus-tie switches are fitted with interlocking devices to prevent paralleling of the supplies; and

(b) If the bus-tie switches are a type that cannot be operated under load, fitted with a warning label to indicate the operating requirements; and

(c) Be installed and identified in accordance with AS/NZS 3000 (Wiring Rules).

In general, where the *distributor* agrees to provide more than one point of supply to an installation, the *customer* must ensure that the supplies cannot be connected in parallel.

Exception: The *distributor* may allow an alternative arrangement where a secure supply is required for electrical installations such as hospitals, sewage treatment plants etc.

5.10.3 Buried Earthing Systems

Provision of a high voltage substation requires the installation of buried earthing systems. These earthing systems are generally installed within 5m of the substation, however in some cases additional earthing cables may be required. These additional earthing cables would generally be located under the line and may extend some distance away from the substation. For safety reasons, it is important that building foundations, *customers'* low voltage earths or other metallic structures be located a distance of at least 5m or more away from the high voltage earthing system. The *distributor* will provide advice on the location of the earthing system for specific installations if required.

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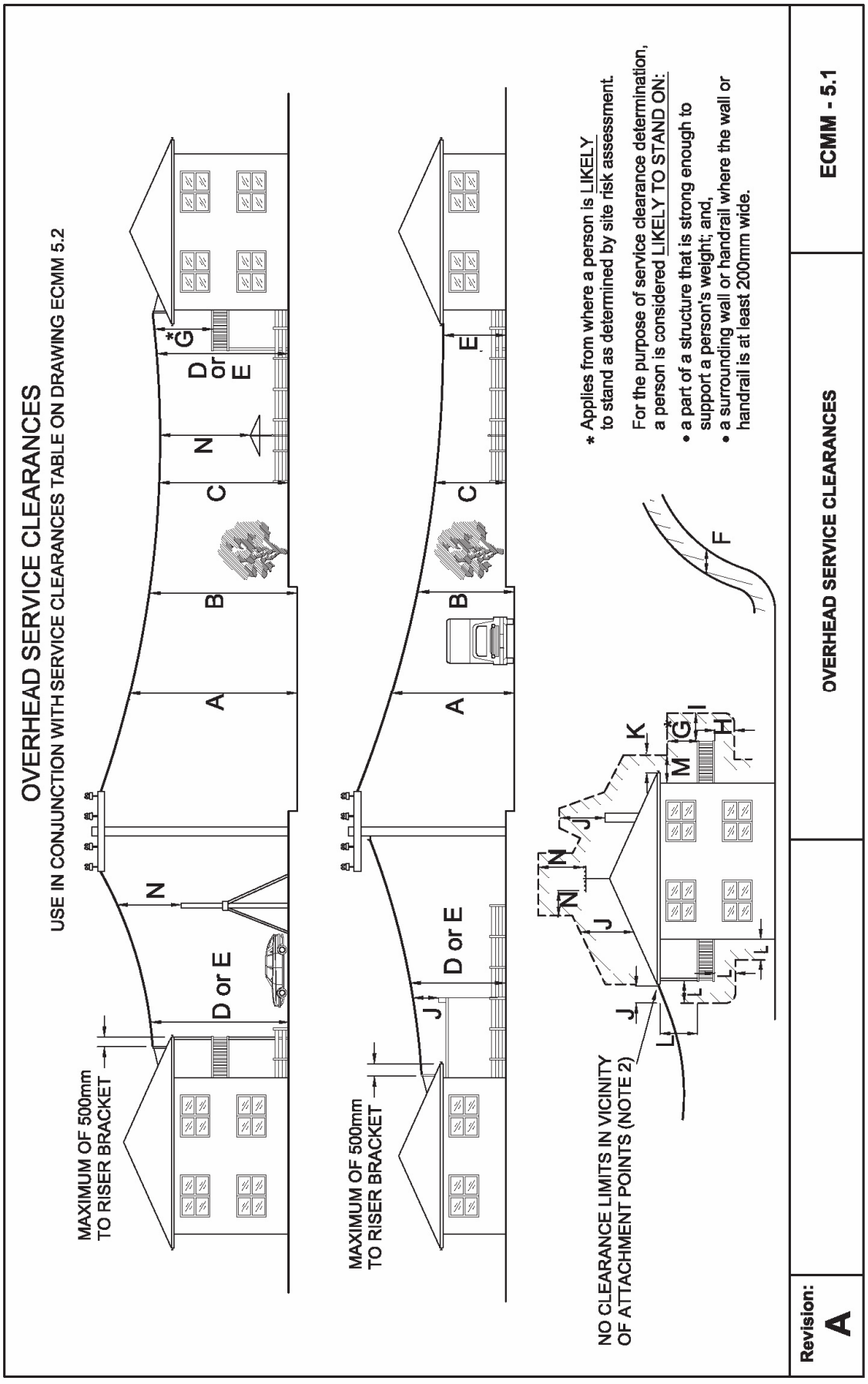

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SERVICE CLEARANCE TABLE

Neutral Screened and Insulated Cables

CODE	LOCATION	DIRECTION	INSULATED SERVICE CABLE
MINIMUM CLEARANCE FROM GROUND ROADS			
A	At centre-line of the carriageway	VERTICALLY	5.5m
B	At kerb line (bottom of kerb)	VERTICALLY	4.9m
C	At fence alignment	VERTICALLY	3.7m
OTHER THAN ROADS			
D	Private driveways and areas including elevated areas used by vehicles	VERTICALLY	4.5m
E	Areas not normally used by vehicles	VERTICALLY	2.7m
F	Road cuttings, embankmemts and other similar places.	HORIZONTALLY	1.5m
MINIMUM CLEARANCE FROM STRUCTURES AND BUILDINGS			
G H I	Unroofed terraces, balconies, sun-decks, paved areas, and similar areas that are subject to pedestrian traffic only, that have a hand rail or wall surrounding the area and on which a person is likely to stand (Note 2) must be-	VERTICALLY ABOVE VERTICALLY BELOW HORIZONTALLY (Note 1)	2.4m 1.2m 0.9m
J K	Roofs or similar structures not used for traffic or resort but on which a person is likely to stand, and for parapets surrounding roofs or similar structures not used for traffic or resort but on which a person is likely to stand (Note 2) must be-	VERTICALLY HORIZONTALLY (Note 1)	0.5m 0.2m
L	Covered places of traffic or resort including for example windows which are capable of being opened, roofed open verandahs and covered balconies must be (Note 6)	IN ANY DIRECTION	1.2m
M	Blank walls, windows which cannot be opened (Note 2) must be-	HORIZONTALLY	0.2m
N	Other structures not normally accessible to persons (Note 2) must be-	IN ANY DIRECTION	1.2m

NOTES :

1. Either the vertical clearance or the horizontal clearance stated must be maintained. Also, in the zone outside the vertical alignment of the building or structure, either the horizontal clearance from the vertical alignment, or vertical clearance above the horizontal level on which a person is likely to stand must be maintained.
2. Stated clearances apply to a service line not attached to the part of the building described.
3. The clearance stated does not apply to the part of the low voltage overhead service line not under tension. Drip loops are excluded however, consideration should be given to drip loop positioning. (Note: Point of supply is to be not more than 600mm from the point of attachment - POA).
4. Where there is no formed footpath, the kerb line means:
   (a) the kerb line of a proposed footpath, or
   (b) where no footpath is proposed, the edge of the existing carriageway or of any proposed widening thereof.
   (c) where there is a formed footpath with kerb & channel, the kerb line means to the bottom of the channel.
5. In situations where the eye screw of a consumer's installation is not provided with an earth tag and is in close proximity to metalwork, (eg the metalwork of a fascia) the eye screw shall be bonded to the earth tail of the house service neutral connector.
6. Where a window sill is determined as not being a place a person is likely to stand (eg. hopper windows, security screened windows and sliding windows), a clearance of 2.4m vertically from floor or 1.2m horizontally shall apply
7. For this table a conductor is taken to be insulated if it is insulated in accordance with AS/NZS 5000.1 (Electric cables - Polymeric insulated - For working voltage up to and including 0.6 / 1kV) or AS/NZS 3560.1 (Electric cables - Cross-linked polyethylene insulated - Aerial bundled - For working voltages up to and including 0.6 / 1 (1.2) kV). Otherwise, it is taken to be uninsulated.

Revision:			
A		**SERVICE CABLE CLEARANCES FROM GROUND & STRUCTURES**	**ECMM - 5.2**

energex positive energy

ERGON ENERGY

EX BMS 01606 Ver 6
EE NA000403R328 Ver 6

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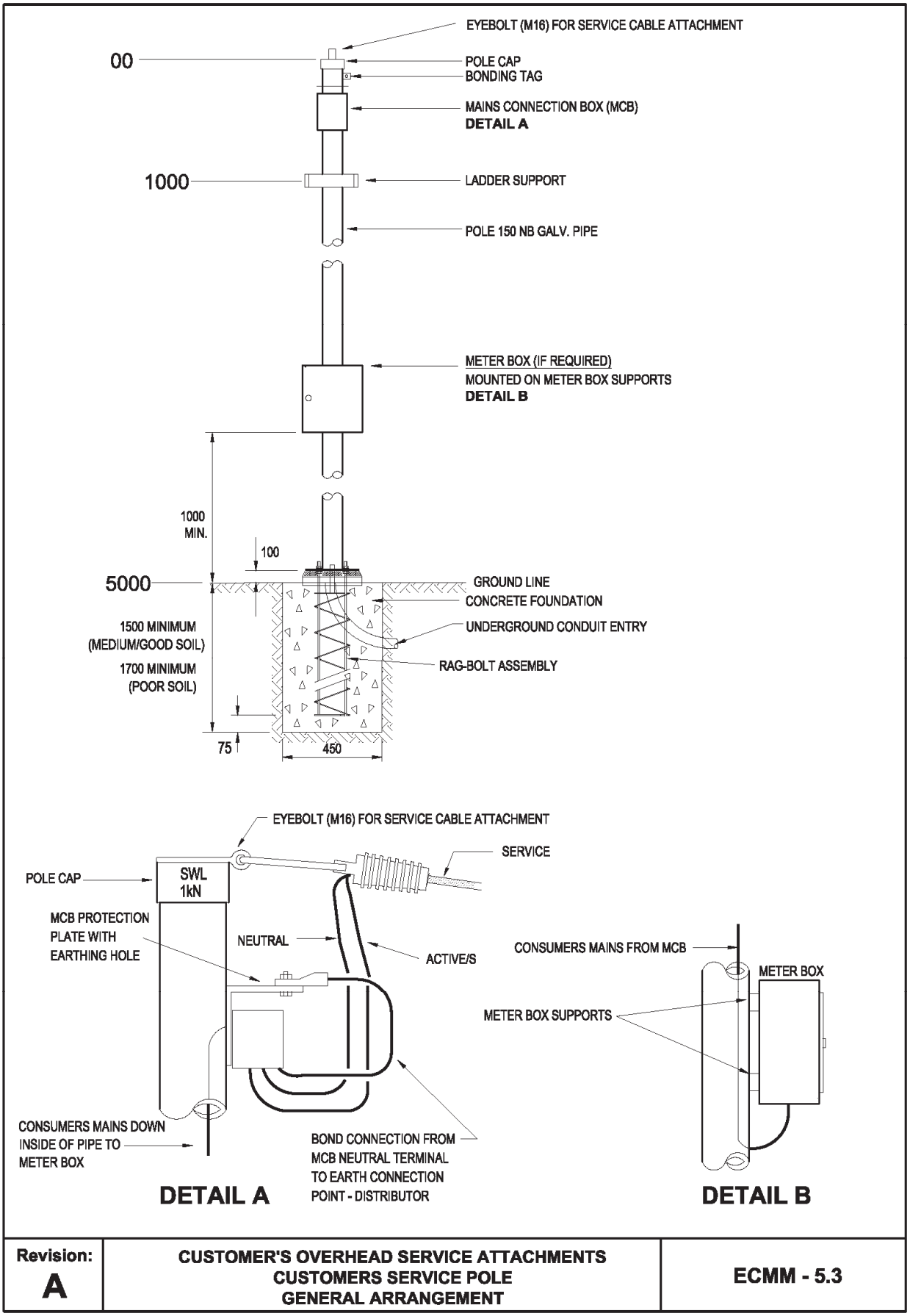

Revision:	CUSTOMER'S OVERHEAD SERVICE ATTACHMENTS CUSTOMERS SERVICE POLE GENERAL ARRANGEMENT	ECMM - 5.3
A		

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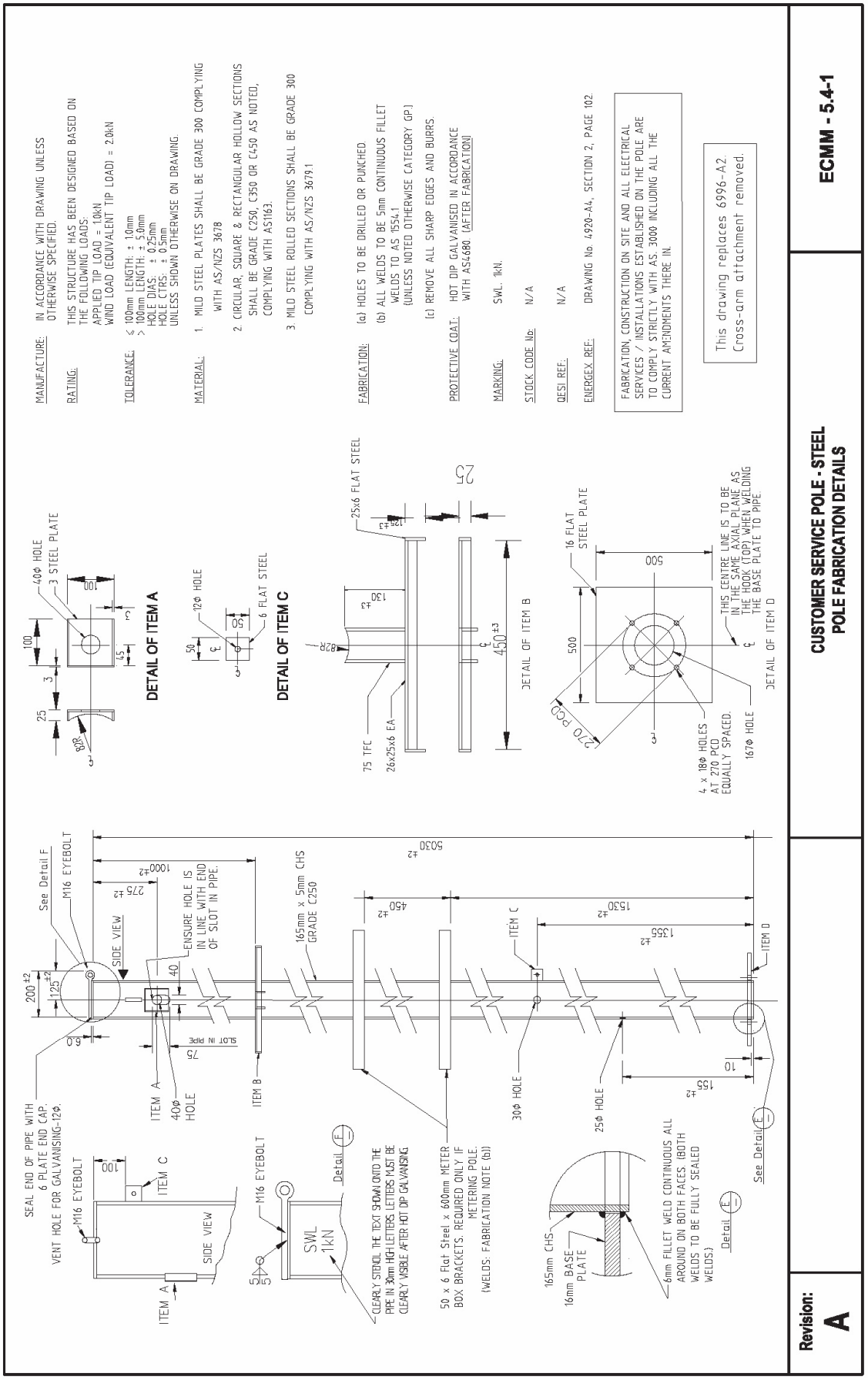

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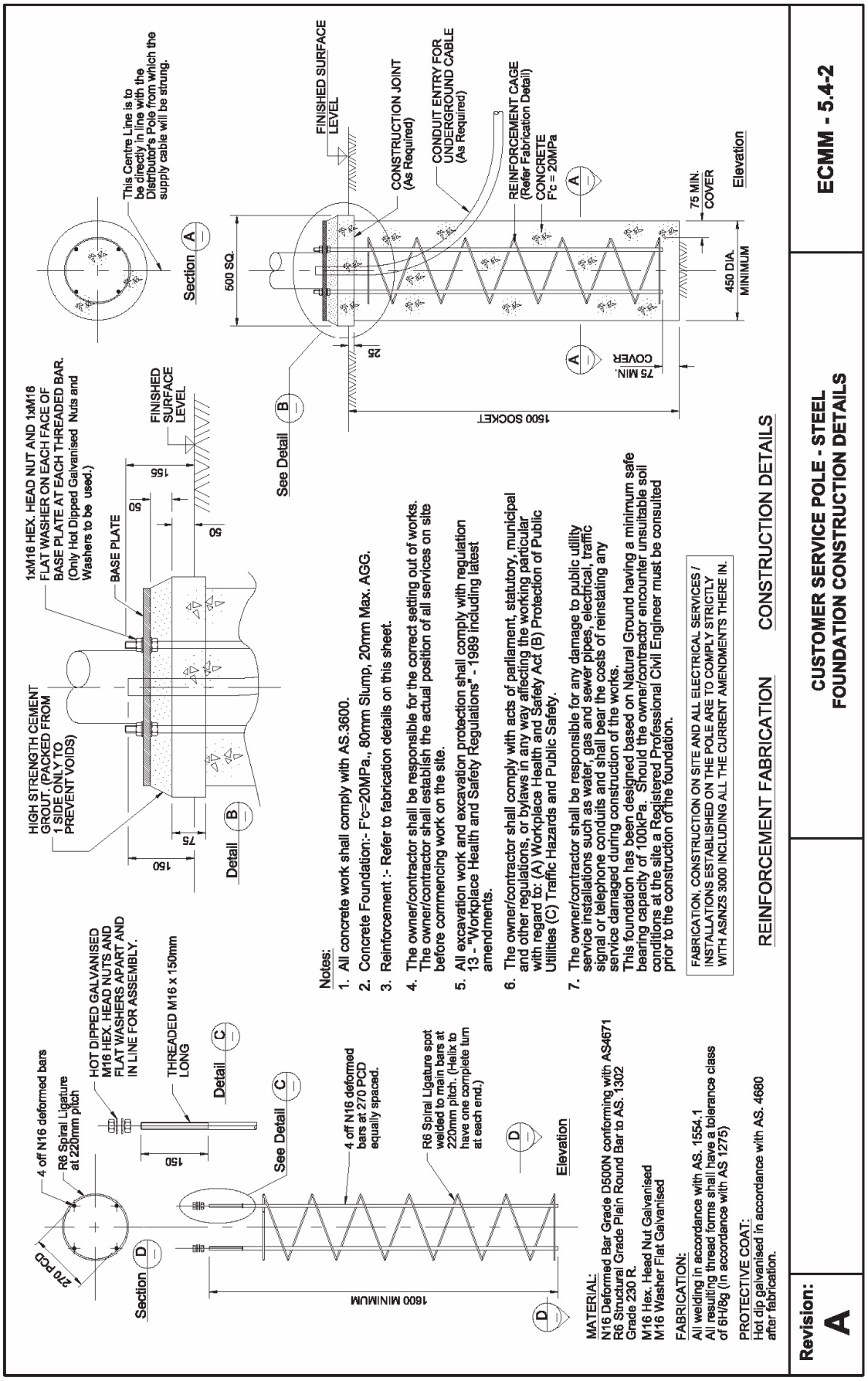

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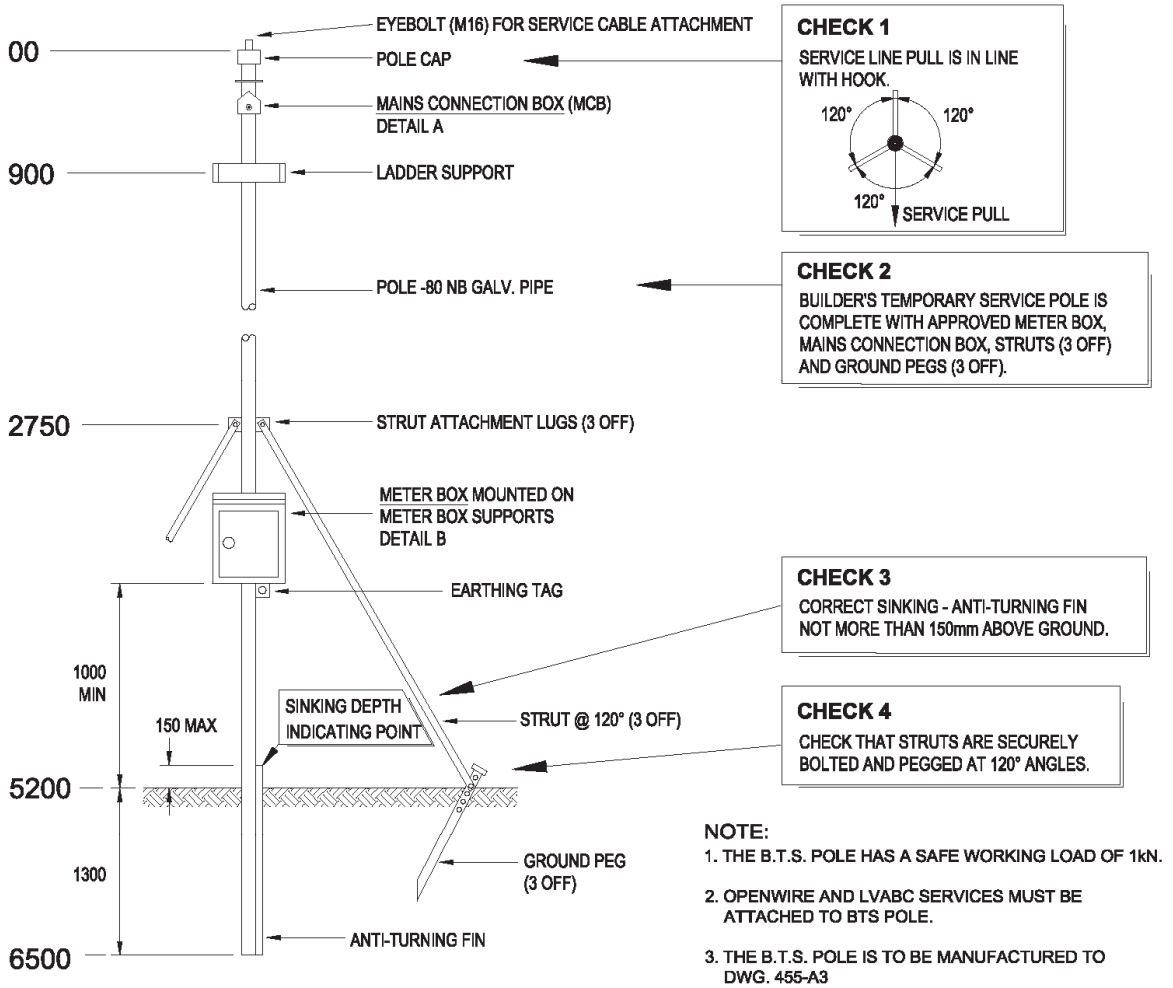
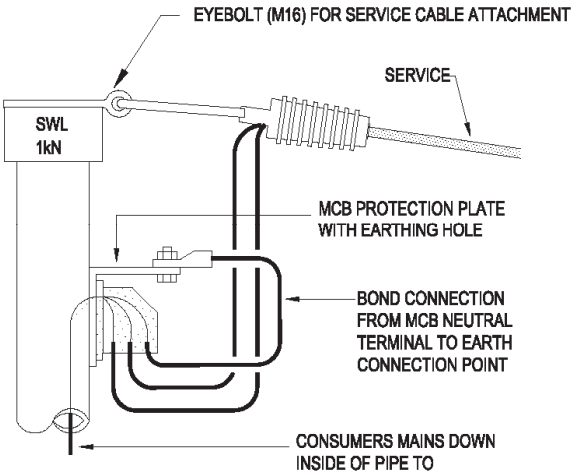
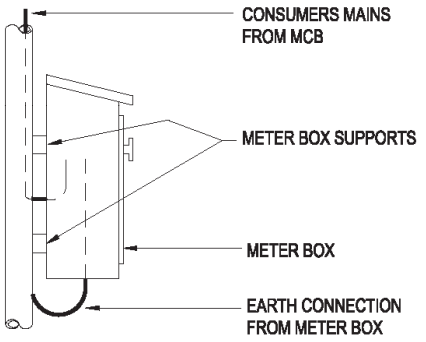


NOTE:

1. THE B.T.S. POLE HAS A SAFE WORKING LOAD OF 1kN.
2. OPENWIRE AND LVABC SERVICES MUST BE ATTACHED TO BTS POLE.
3. THE B.T.S. POLE IS TO BE MANUFACTURED TO DWG. 455-A3
4. MAINS CONNECTION BOX MUST BE SUITABLE FOR THE TERMINATION OF THE SERVICE (LVABC).
5. A SEPARATE EARTH ELECTRODE WILL BE REQUIRED IF THE STEEL POLE IS PAINTED OR COATED WITH ANY SUBSTANCE THAT WILL AFFECT ITS ABILITY TO MAKE GOOD CONTACT WITH THE SOIL.



DETAIL A



DETAIL B

Revision: A	CUSTOMER'S OVERHEAD SERVICE ATTACHMENTS BUILDERS TEMPORARY SERVICE POLE GENERAL ARRANGEMENT	ECMM - 5.5

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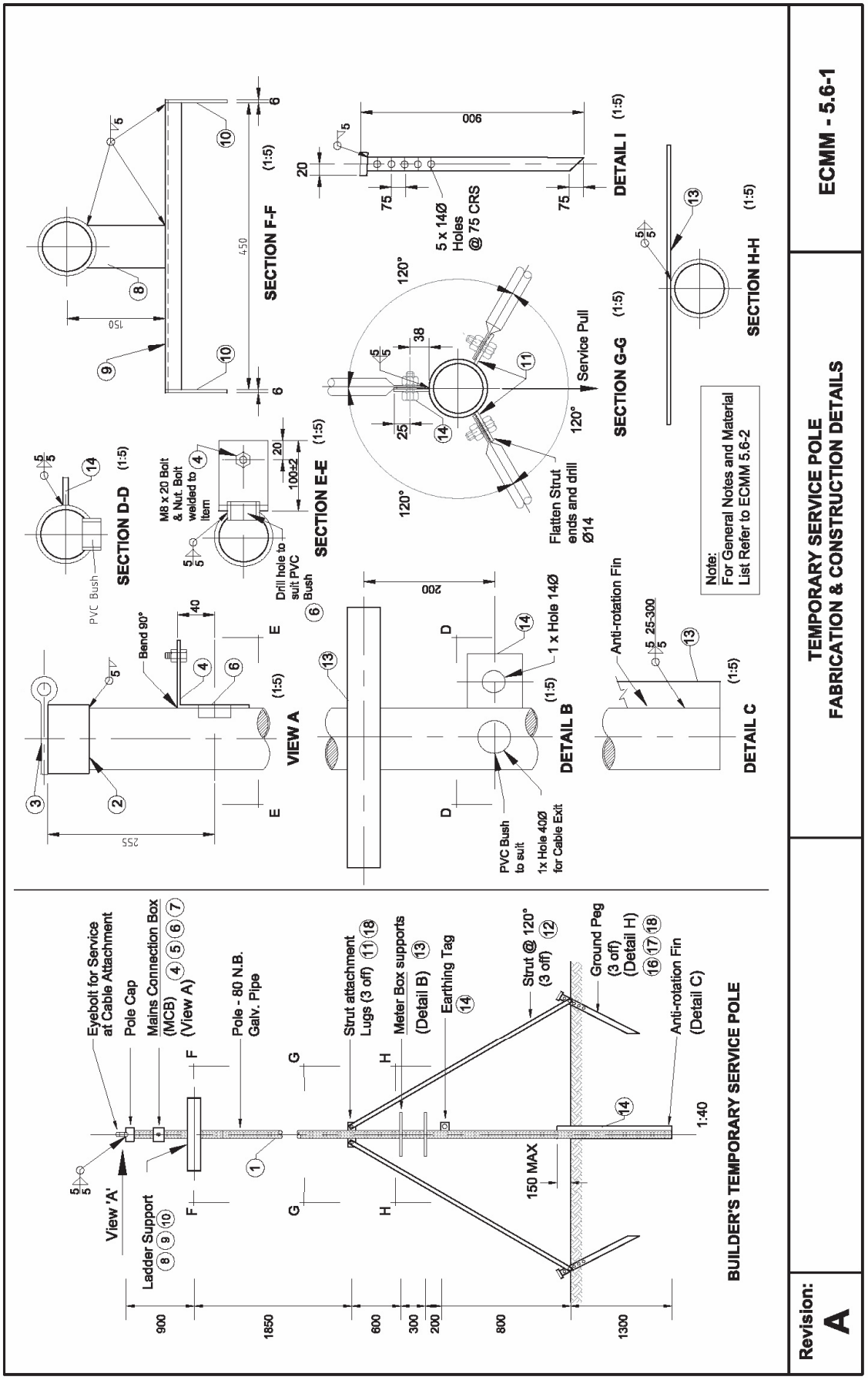

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MATERIAL LIST

Item	Description	No. Off	Description
①	Pole	1	80 N.B. x 4.0 Thk. x 6500Lg. Std. Galv. Pipe
②	Cap or Disc	1	To suit 80N.B. Pipe
③	Service Attachment Ring	1	M16 Eyebolt
④	Mains connection Box Baseplate	1	FL 75 3 x 200 Lg. Bent 90° as shown on drawing
⑤	Mains Connection Box	1	3 terminal clipsal Cat. No. IP23
⑥	Threaded PVC Bush	1	To suit MCB
⑦	Screw (Drill & tap item-4 to suit MCB)	2	M5 x 12Lg. S/S Grade 304
⑧	Ladder Support Bracket	1	Taper-flange Channel
⑨	Ladder Support Member	1	L 25x25x6x450Lg
⑩	Ladder Stops	2	L 25x6x125Lg
⑪	Strut Attachment Lug	3	FL 75 x 10 x 75Lg.
⑫	Strut Members	3	25N.B. x 3150Lg. Std. Galv. Pipe
⑬	Meter Box Supports	2	FL 50 x 6 x 400Lg.
⑭	Earthing Lug	1	FL 50 x 6 x 50Lg.
⑮	Stabilising fin	1	FL 50 x 6 x 1450Lg.
⑯	Peg	3	L38 x 38 x 6 x 900Lg. (See Detail 3)
⑰	Striking Plate	3	FL 50 x 10 x 50 Lg.
⑱	Bolt & Nut	6	M12 x 40 Lg. Hex. Galv.

SPECIFICATIONS

RATING : -

TOLERANCE : All tolerances to be ±5.0

MATERIAL : Structural steel in accrodance with AS 4100.

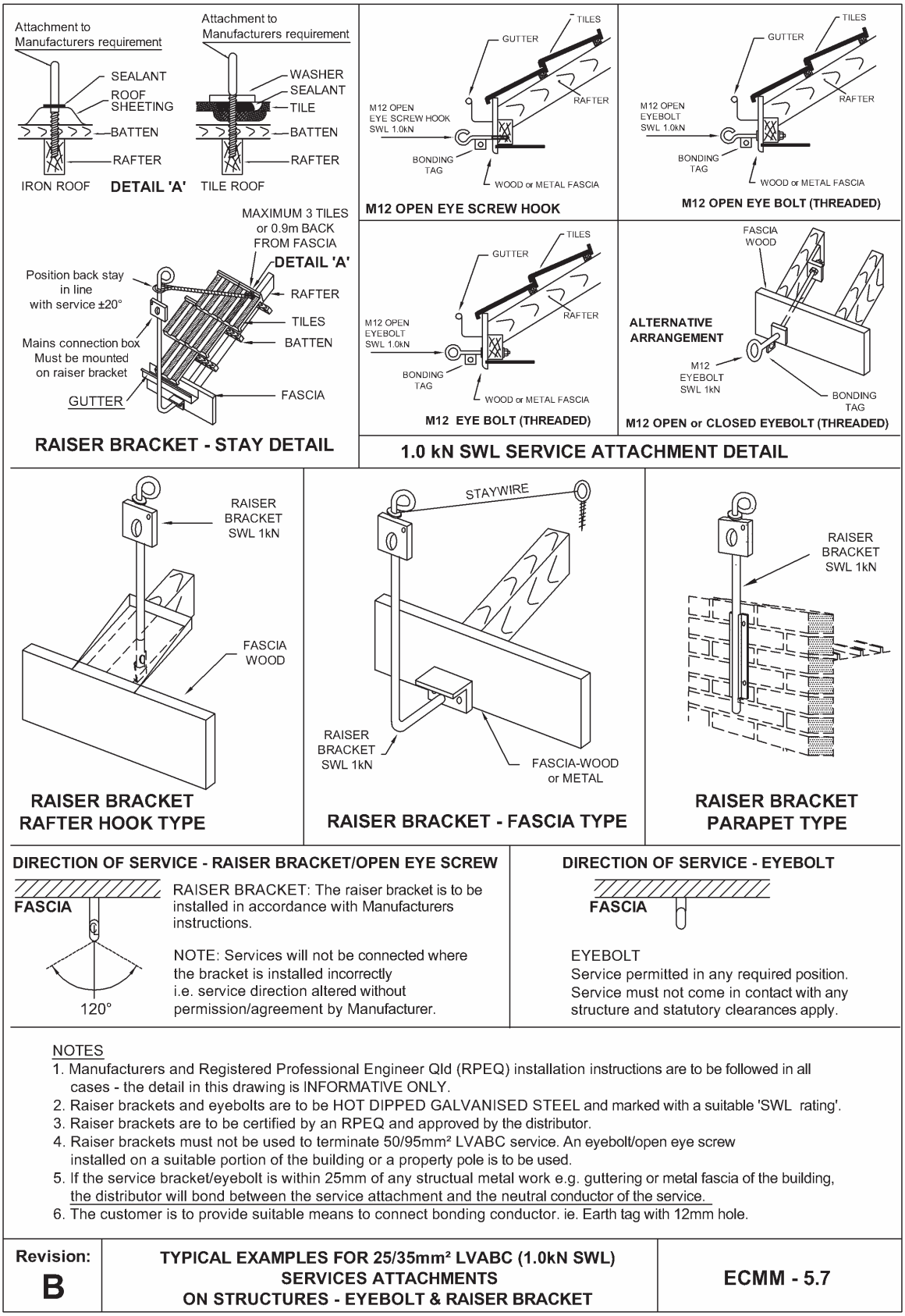
MATERIAL : Structural Steel in Accordance with AS 1204 Grade 250. See material list for details.

FABRICATION : (a) Holes to be drilled or punched undersize & reamed.
(b) Welding to be in accordance with AS 1554.1
(c) All sharp edges and burrs to be removed.

PROTECTIVE COAT : All steelwork to be effectively corrosion protected.

Note:
For Construction and Details refer ECMM 5.6-1

Revision:		TEMPORARY SERVICE POLE FABRICATION AND CONSTRUCTION DETAILS	ECMM - 5.6-2
A			



NOTES

1. Manufacturers and Registered Professional Engineer Qld (RPEQ) installation instructions are to be followed in all cases - the detail in this drawing is INFORMATIVE ONLY.
2. Raiser brackets and eyebolts are to be HOT DIPPED GALVANISED STEEL and marked with a suitable 'SWL rating'.
3. Raiser brackets are to be certified by an RPEQ and approved by the distributor.
4. Raiser brackets must not be used to terminate 50/95mm² LVABC service. An eyebolt/open eye screw installed on a suitable portion of the building or a property pole is to be used.
5. If the service bracket/eyebolt is within 25mm of any structual metal work e.g. guttering or metal fascia of the building, the distributor will bond between the service attachment and the neutral conductor of the service.
6. The customer is to provide suitable means to connect bonding conductor. ie. Earth tag with 12mm hole.

Revision:	TYPICAL EXAMPLES FOR 25/35mm² LVABC (1.0kN SWL) SERVICES ATTACHMENTS ON STRUCTURES - EYEBOLT & RAISER BRACKET	ECMM - 5.7
B		

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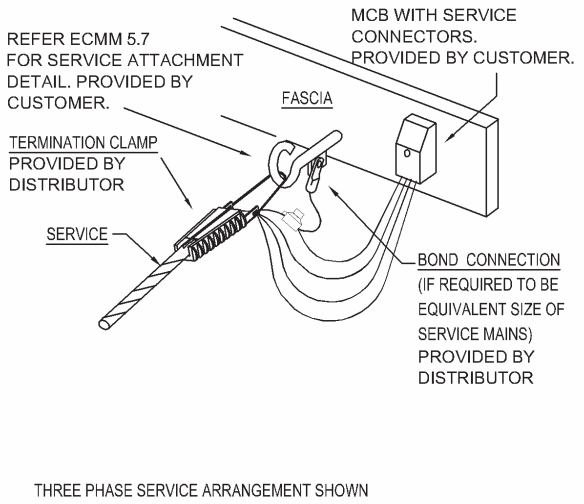
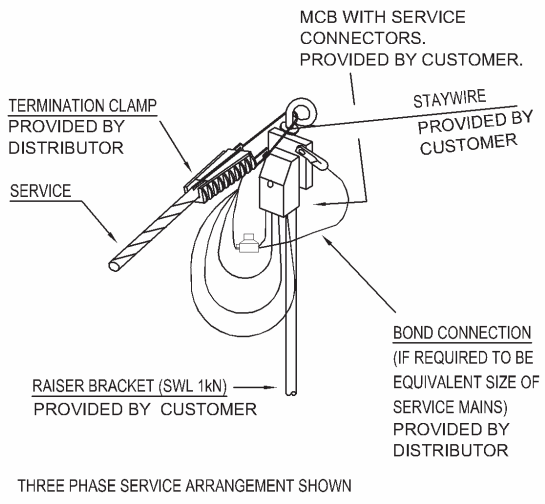
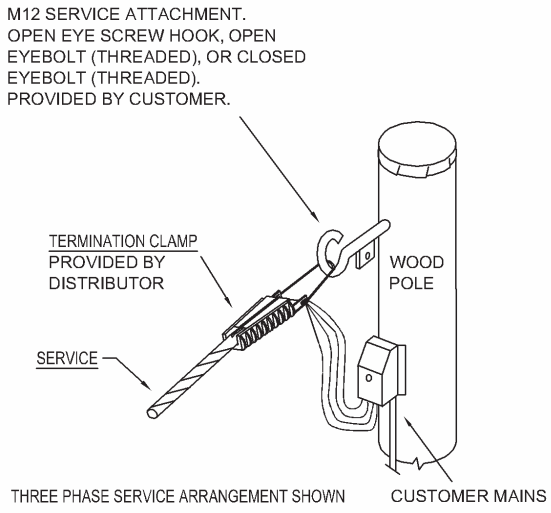
CUSTOMER TO PROVIDE THE MEANS FOR ATTACHMENT AND CONNECTION OF THE SERVICE TO THE CUSTOMER'S INSTALLATION



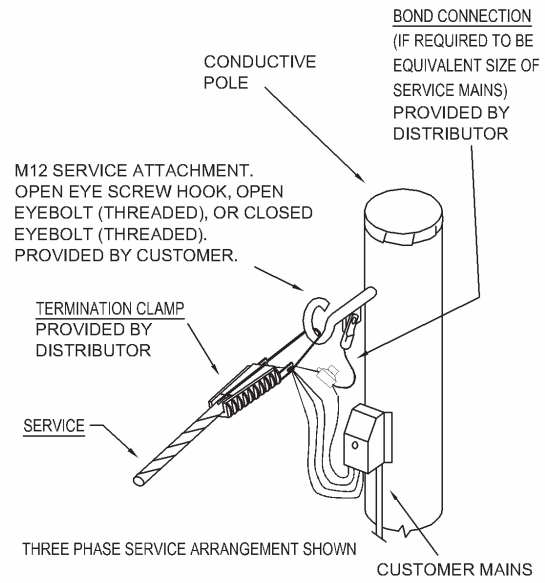
25/35 sqmm LVABC SERVICE CONNECTION WOOD OR METAL FASCIA



25/35 sqmm LVABC SERVICE CONNECTION GALVANISED STEEL RAISER BRACKET



25/35 sqmm LVABC SERVICE CONNECTION CUSTOMER'S WOOD POLE



25/35 sqmm LVABC SERVICE CONNECTION CUSTOMER'S CONDUCTIVE POLE

NOTES
1. TO PREVENT CORROSION COPPER CONDUCTORS SHALL NOT BE DIRECTLY CONNECTED TO GALVANISED SURFACES.

2. CUSTOMER TO SUPPLY AND INSTALL APPROVED MAINS CONNECTION BOX OR NON-METALLIC UV STABILISED WEATHERPROOF ENCLOSURE. (REFER TO CLAUSE 5.4.6(e) SEE DETAIL FOR MIN SIZE.

Revision: B	CUSTOMER'S OVERHEAD SERVICE ATTACHMENTS 1.0kN SWL CONNECTION AND BRIDGING DETAIL	ECMM - 5.8

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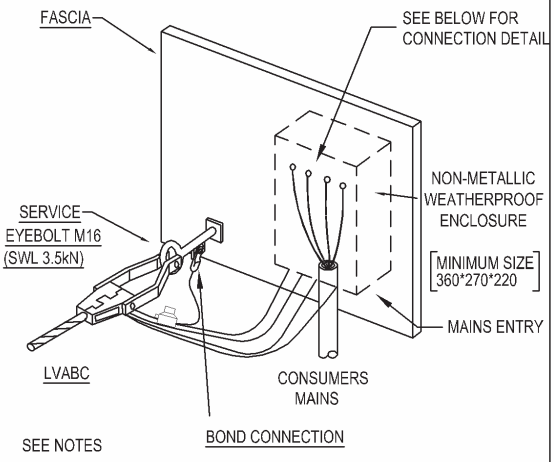
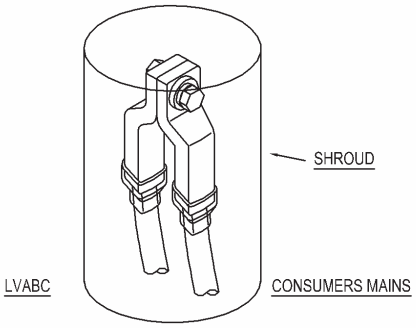
CUSTOMER TO PROVIDE THE MEANS FOR ATTACHMENT AND CONNECTION OF THE SERVICE TO THE CUSTOMER'S INSTALLATION

UP TO 200 AMP



TYPICAL SINGLE LVABC SERVICE TO CUSTOMER'S MAINS CONNECTION DETAIL

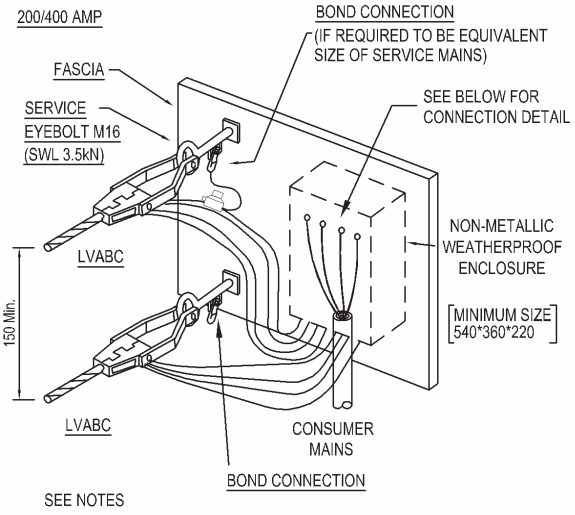


LVABC PHASE CONNECTION TO SINGLE CUSTOMERS MAINS

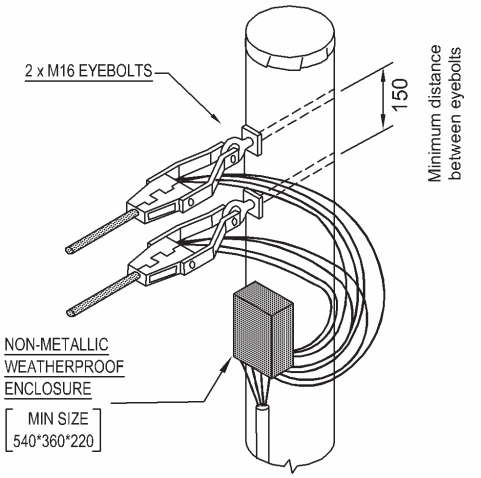
NOTES

1. CUSTOMER TO SUPPLY AND INSTALL APPROVED MAINS CONNECTION BOX OR NON-METALLIC UV STABLISED WEATHERPROOF ENCLOSURE AND SUITABLE LUGS. (REFER TO CLAUSE 5.4.6(e). SEE DETAIL FOR MIN SIZE)
2. CUSTOMER TO SUPPLY LUGS TO SUIT CURRENT RATING OF CABLE AND SHALL ACCOMMODATE A 12MM S/S BOLT. CUSTOMER TO SUPPLY LUG DIES WHERE REQUIRED. CONSUMERS MAINS TO ENTER THROUGH BOTTOM OF ENCLOSURE.
3. ALTERNATE CONNECTIONS METHOD USE APPROPRIATE COPPER BUS BAR.
4. COVER WITH INSULATING SHROUD AND SECURE WITH ZIP TIE.
5. THE BONDING OF EXPOSED METALWORK (EYEBOLT) MUST USE A CONDUCTOR SIZE THE SAME AS THE LVABC NEUTRAL.
6. IPC'S MUST BE USED TO CONNECT ALL EARTHING CONDUCTORS TO LVABC NEUTRAL.

200/400 AMP

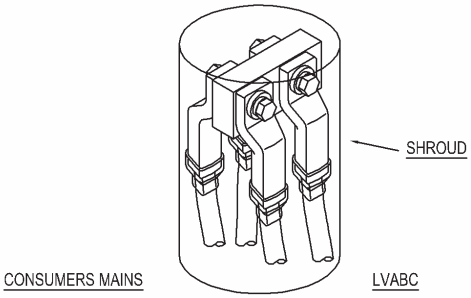


TYPICAL TWIN LVABC SERVICE TO CUSTOMER'S MAINS CONNECTION DETAIL



TWIN 50/95 sqmm LVABC SERVICE CONNECTION

CUSTOMER'S WOOD POLE



TWIN LVABC PHASE CONNECTION TO PARALLEL CUSTOMER'S MAINS

Revision: B	CUSTOMER'S OVERHEAD SERVICE ATTACHMENTS CONNECTION AND BRIDGING DETAIL FOR SINGLE AND TWIN LVABC SERVICES FOR C & I INSTALLATIONS (MAX 400 A)	ECMM - 5.9

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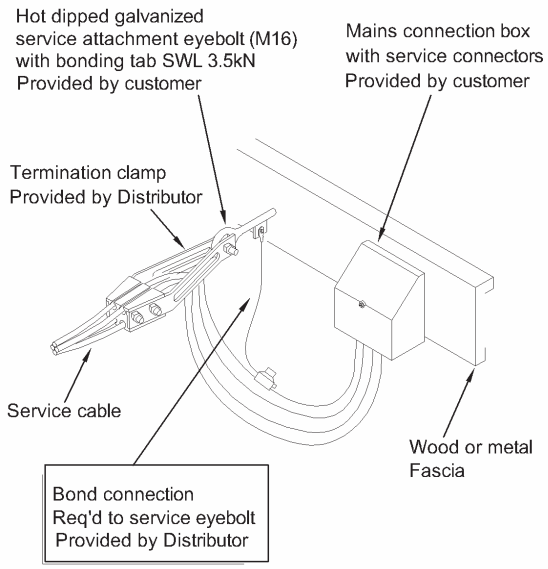
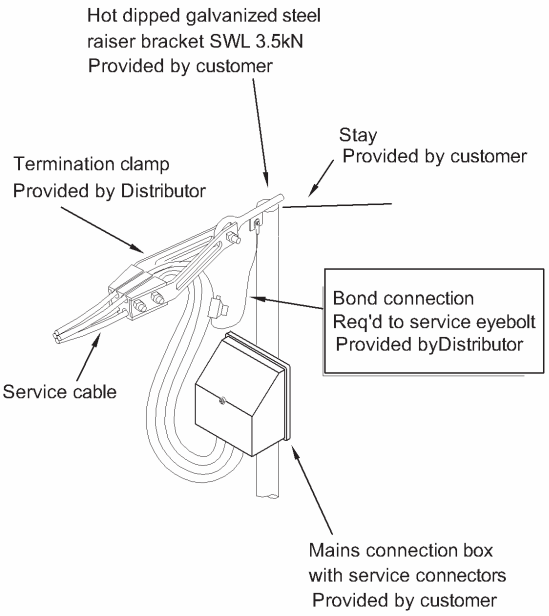
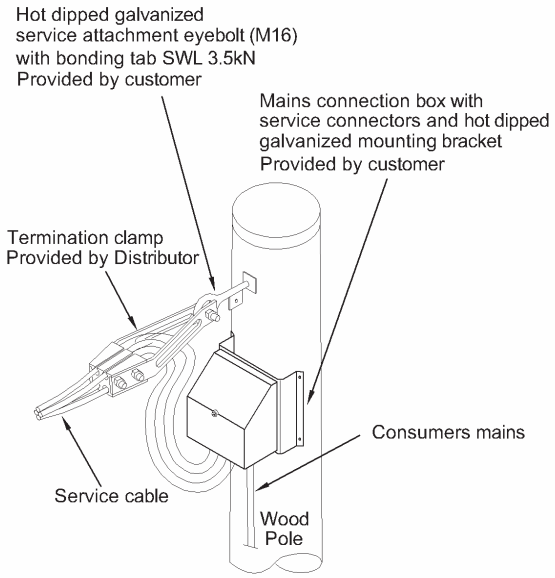


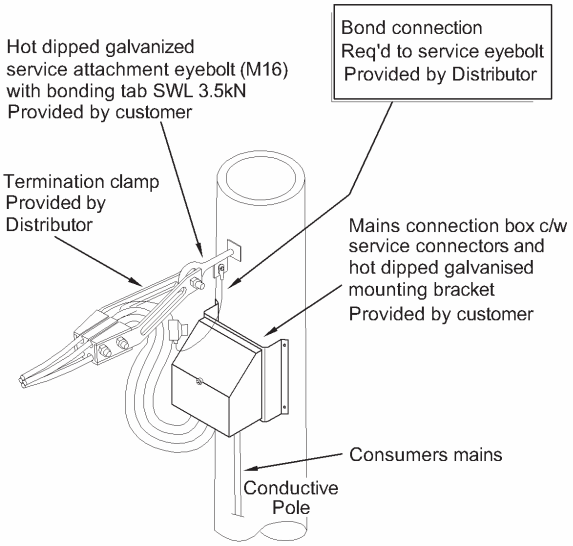
50/95 sqmm LV ABC SERVICE CONNECTION
WOOD OR METAL FASCIA - 3.5kN SWL



50/95 sqmm LV ABC SERVICE CONNECTION
GALVANISED STEEL RISER BRACKET - 3.5kN SWL



50/95 sqmm LV ABC SERVICE CONNECTION
CUSTOMER'S WOOD POLE



50/95 sqmm LV ABC SERVICE CONNECTION
CUSTOMER'S CONDUCTIVE POLE

Revision: B	MAINS CONNECTION BOX WITH SERVICE CONNECTORS 50/95 sqmm LVABC SERVICE - 3.5kN SWL ATTACHMENTS	ECMM - 5.10

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6. METERING REQUIREMENTS

6.1. General

Basic metering arrangements are shown in Sections 6 to 11.

Note: The *metering provider* in Sections 6 to 11 may be the *distributor* or a person who meets the requirements listed in Schedule 7.4 of the *National Electricity Rules* and is registered with the *AEMO*. The *distributor* is the *metering provider* for all *small customers, large non-market customers* and *large unmetered supply customers,* and for other *large market customers* when appointed by the *retailer.* (Refer to Glossary of Terms, Purpose and Scope and Section 2, *Customer's* Installations for details).

All metering shall be connected with suitable active isolation devices connected to the line side of the metering to allow safe access to the metering equipment. (Refer to Clauses 7.2 and 9.2 for more detailed information on metering isolation requirements).

Any variations to the standard metering practice require prior approval in writing (i.e. the metering provider must be contacted if an enhanced metering scheme is required for complex installations).

Where a *customer* directs a *retailer* to request metering or tariff changes, any alterations to the *customer's* switchboard installation or meter enclosure shall be the *customer's* responsibility (e.g. removal of asbestos).

Metering and control equipment deemed to be necessary by the *metering provider* to record and control electricity consumption shall be supplied and maintained by the *distributor* or the *metering provider* and shall remain their property.

Customers' installations other than those approved as suitable for *unmetered supply* (e.g. non-standard installations located on public land (refer to Clauses 2.6 and 5.9)) will be metered by one of the following methods:

(a) *Direct connected meters*; or

(b) *Current transformer metering*. (Refer to Section 9); or

(c) HV current transformer - voltage transformer metering. (Refer to Section 11).

Where it is known that a three-phase supply will be required at the time of initial connection, provision for polyphase metering shall be installed at this time. All phases of a *service line* are required to be connected at the initial connection of the *premises*.

All metering and control equipment shall be back-wired and mounted on a hinged panel attached to a metering enclosure or a switchboard frame.

For multiple tenancy installations, access to sub boards within tenancies will be required for verification of submains and metering.

Where metering or control equipment is no longer required, the *MP* shall be contacted to arrange for its removal.

Refer to TABLE 7.1 for meter space requirements.

6.2. Metering Determination

The *customer* (or their *electrical contractor*) is responsible for determining and monitoring the installation's load requirements, and method of metering (i.e. *direct connected* or *current transformer metering*). This applies to new connections and/or alterations or additions. The *customer* may need to consult with the customer's *retailer* at the earliest opportunity in order to determine their metering requirements.

6.3. *Direct Connected Metering*

General policy is to use single-phase *direct connected* electronic kilowatt-hour meters for all single-phase and two phase domestic, rural and commercial metering. Polyphase meters are available for use in domestic, rural and commercial three phase installations. (Refer to Section 7, Drawings ECMM 7.3, 7.5 and 7.7). (Refer to Section 10 for *IES* metering arrangements).

ENERGEX Distribution Area

Within the *ENERGEX* distribution area *integrated* single-phase meters (including general supply, *controlled supply* and *AF receiver*) are available for limited use on existing installations where space is restricted or where additional meter enclosures may be required. (Refer to Section 8, Drawing ECMM 8.3).

Ergon Energy Distribution Area

Within the *Ergon Energy* distribution area *integrated* single phase meters (including general supply and *controlled supply*) will be utilised with a separate *AF receiver* in ripple control Areas.
Integrated meters will be supplied for multi-tenanted installations (excluding duplexes) and are available for limited use on existing installations where space is restricted or where additional meter enclosures may be required.
(Refer to Section 8 Drawing ECMM 8.4 and ECMM 8.14).

Notes:

1. In designated areas where AF signal is not available, the *metering provider* will supply *integrated meters* with built-in time clocks where load switching of permanently connected loads are required as part of supply conditions. Information on areas designated as having no AF signal can be obtained by contacting the *distributor*. (Refer to Clause 6.7 and page 1 for contact details).
2. Space requirements for these meters are given in TABLE 7.1.

Except in the areas described below, plug-in kilowatt hour meters are only available on existing installations where the plug-in type bases are already installed.

6.3.1 Plug-in Metering for Remote Communities and Isolated Generation in Far North Queensland

In *Ergon Energy's* Far North Queensland region, single element *card operated meters* (COMs) will be supplied for designated remote communities and most isolated generation sites in the Torres Strait Islands.

Single phase *card operated meters*, are supplied as plug-in meters only and require a four jaw plug-in meter base to be provided and installed by the *customer* (Catalogue Number 828402). Commercial installations requiring special tariffs or *current transformer metering* will use *direct connected meters* as outlined in this manual.

In general Ergon Energy will provide one service to a community title scheme or cluster development installation with *card operated meters*.
Where a cluster or community title scheme development with *card operated meters* consists of a number of tenanted buildings a meter position located on common ground for each building may be permitted.
The following meter positions will also be acceptable:

(i) The main switchboard located on common ground and all metering equipment installed at this position.

(ii) The main switchboard and the first metering point located on common ground and subsequent metering points located either on each building or as otherwise approved by Ergon Energy.

Note: -Check Metering shall be connected on the line side of and located with the Community Meter at the first metering point.
- A single community meter position is preferred, however approval may be granted for an additional community meter where a single position is not practical. Each community meter will be treated as a separate account for billing purposes.

To clarify the required metering type in the remote communities and isolated generation sites in Far North Queensland contact *Ergon Energy* Customer Service. (Refer to page 1 for contact details).

6.4. SWER Installation Metering

For rural *customers* connected to Single Wire Earth Return (SWER) networks, the metering shall be connected as per TABLE 6.1.

TABLE 6.1

Voltage of Secondary Supply	Supply Capacity	Metering Configuration	Reference Drawing
240V	<= 25kVA (100A)	*Direct connected* 1 x single phase meter	ECMM - 6.2
240V	> 25kVA	Current transformer 1 x three phase meter	ECMM - 6.3
480V	<= 50kVA (200A) (Load split across phases @ <= 100A/phase)	*Direct connected* 2 x single phase meters*	ECMM - 6.1
480V	> 50kVA	Current transformer 1 x three phase meter	ECMM - 6.4

Notes:

1. 480V supply is not available within the ENERGEX distribution area.

* 2. 1 x *direct connected* three phase meter shall be used for 480V *IES* installations (Refer to Drawing ECMM 6.5).

6.5. Contactor for *Controlled Supplies*

Where a contactor is required it shall be supplied by the *customer*, be of a type acceptable to the *metering provider* and shall be installed in an accessible position on, or adjacent to the meter panel, in a sealable fit for purpose enclosure (if required). (Refer to Section 8, Drawings ECMM 8.8 - 8.12).

The contactor shall not be used for automatic load control; (e.g. it shall not have a humidistat, a thermostat, a pressure switch or the like connected in its control circuit). (Refer to Clause 8.3.2).

6.6. *AF Receivers*

For *controlled supplies* in most areas, excluding those described in Clause 6.7, the *metering provider* will supply an *AF receiver*. (Refer to Section 8). *Integrated meters* may have one or two switches internal to the meter that are associated with one *controlled supply*.

Two and three switch *AF receivers* will be utilised for the following situations:

(a) For single installations where a combination of water heating and other *controlled load*s are connected. (Refer to Section 8 and Drawings ECMM 8.1 - 8.6 and 8.13);

(b) For multiple installations, such as flats and home units. (Refer to Drawing ECMM 8.7 (*ENERGEX*) or 8.14 (*Ergon Energy*)).

6.7. Time Switches

Separate time switches will not be used for any new metering installations.

Exception: For controlled or time of use supplies in designated areas without suitable AF signal, the *metering provider* will provide a time switch or an *integrated meter* with an internal time switch. (Refer to TABLE 7.1 for space requirements). The *metering provider* will supply fuses and sealing blocks if required for use with time switches (for multiple installations with primary protection above 100A). (Refer to Section 8, Drawing ECMM 8.7 (*ENERGEX*) or 8.14 (*Ergon Energy*)).

Within the *Ergon Energy* distribution area this includes all isolated generation sites at Bedourie, Birdsville, Boulia, Camooweal, Jundah, and Windorah. *Electrical contractors* should contact the *distributor* for details of other areas. (Refer to page 1 for contact details).

Within the *ENERGEX* distribution area this includes parts of the CBD, Fortitude Valley, Spring Hill and Pinkenba. (Refer to page 1 for contact details).

6.8. *Customer*'s Energy Management Systems

A *customer* requiring an interface with the *metering provider's* facilities should contact the *metering provider*. Costs to the *customer*, and responsibility for any of the work necessary to supply the requested facilities, will be negotiated for individual installations.

Only the *metering provider's* personnel are permitted to install approved *customers* equipment into the *metering provider*'*s* revenue metering systems.

6.8.1 Approval of Equipment

The *metering provider* shall approve all devices that require an interface with the *metering provider*'*s* metering circuits. Non-approved devices should be submitted to the *metering provider* for approval. Full written technical specifications must accompany the device.

6.9. *Customers* with Remotely Read Interval Meters

Large customers who have market contracts with an electricity *retailer* must have remotely read interval meters in accordance with the *National Electricity Rules*. Where the *National Electricity Rules* or the (Queensland) *Electricity Industry Code* does not cover specific details, the requirements of this document apply.

These sites can be identified by labelling applied to the metering equipment and include a *National Metering Identifier* (*NMI*) number and contact details for the nominated *metering provider*. The *metering provider* must be contacted prior to any work being done that may impact on the metering installation.

6.10. *Current Transformer Metering*

Electronic polyphase kilowatt-hour meters shall be used for all new *current transformer metering*. Space requirements are shown in TABLE 7.1 and drilling details in Section 9, Drawing ECMM 9.5.

Note: For details of *current transformer metering* refer to Section 9.

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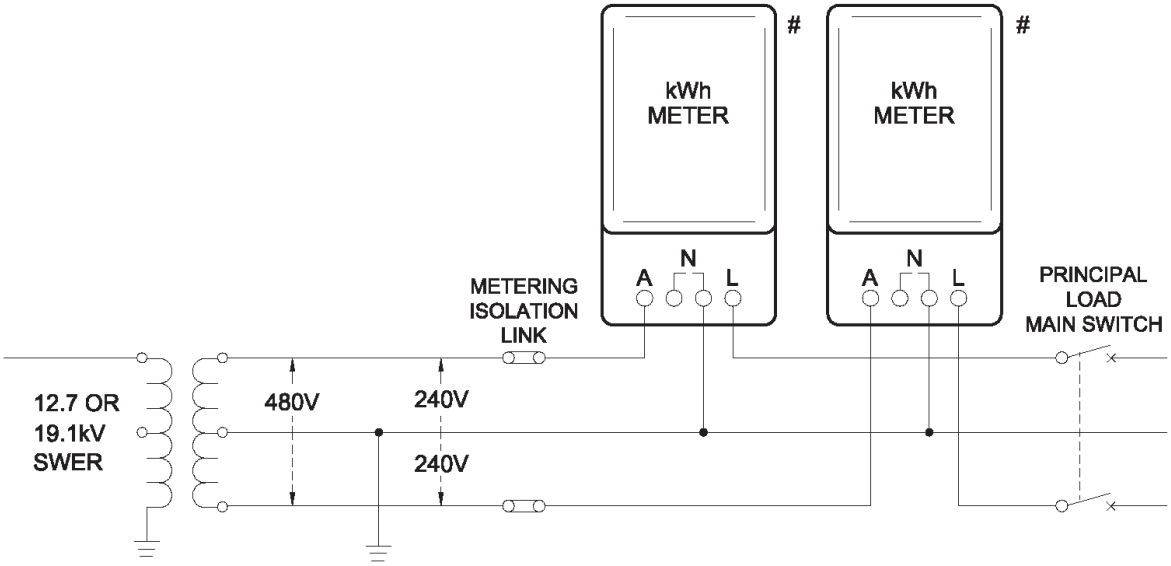

ITEMS SUPPLIED BY METERING PROVIDER

• SOLDERED CONNECTION

NOTES:

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. METERS AND METERING ISOLATION LINKS TO BE SEALED BY METERING PROVIDER.
3. 480V SUPPLY IS NOT AVAILABLE WITHIN THE ENERGEX DISTRIBUTION AREA.

Revision: A	SINGLE PHASE DIRECT CONNECTED METERING 480 VOLT SWER CONFIGURATION TYPICAL WIRING DIAGRAM	ECMM - 6.1

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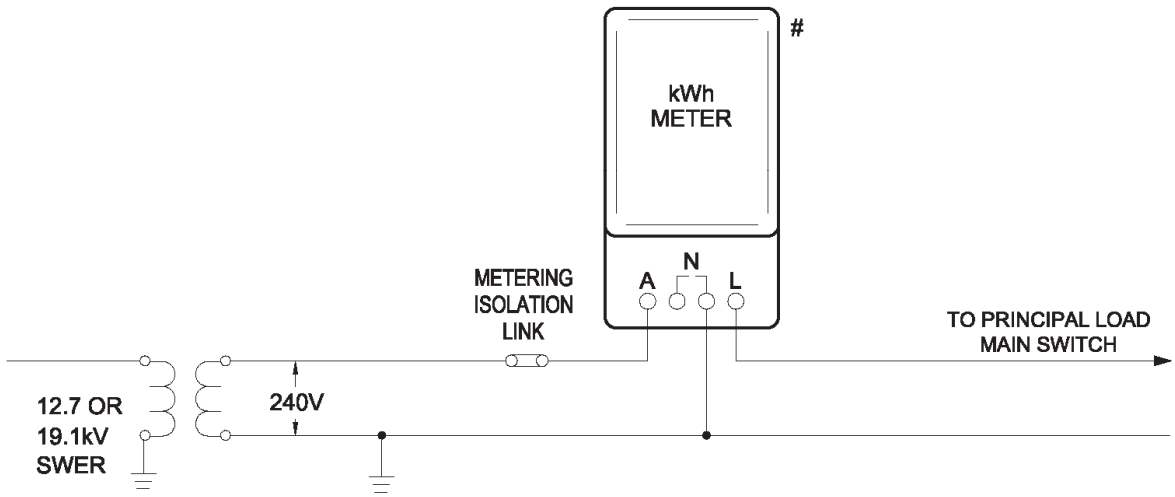

ITEMS SUPPLIED BY METERING PROVIDER

• SOLDERED CONNECTION

NOTES:

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. METER AND METERING ISOLATION LINK TO BE SEALED BY METERING PROVIDER.

Revision: A	SINGLE PHASE DIRECT CONNECTED METERING 240 VOLT SWER CONFIGURATION TYPICAL WIRING DIAGRAM	ECMM - 6.2

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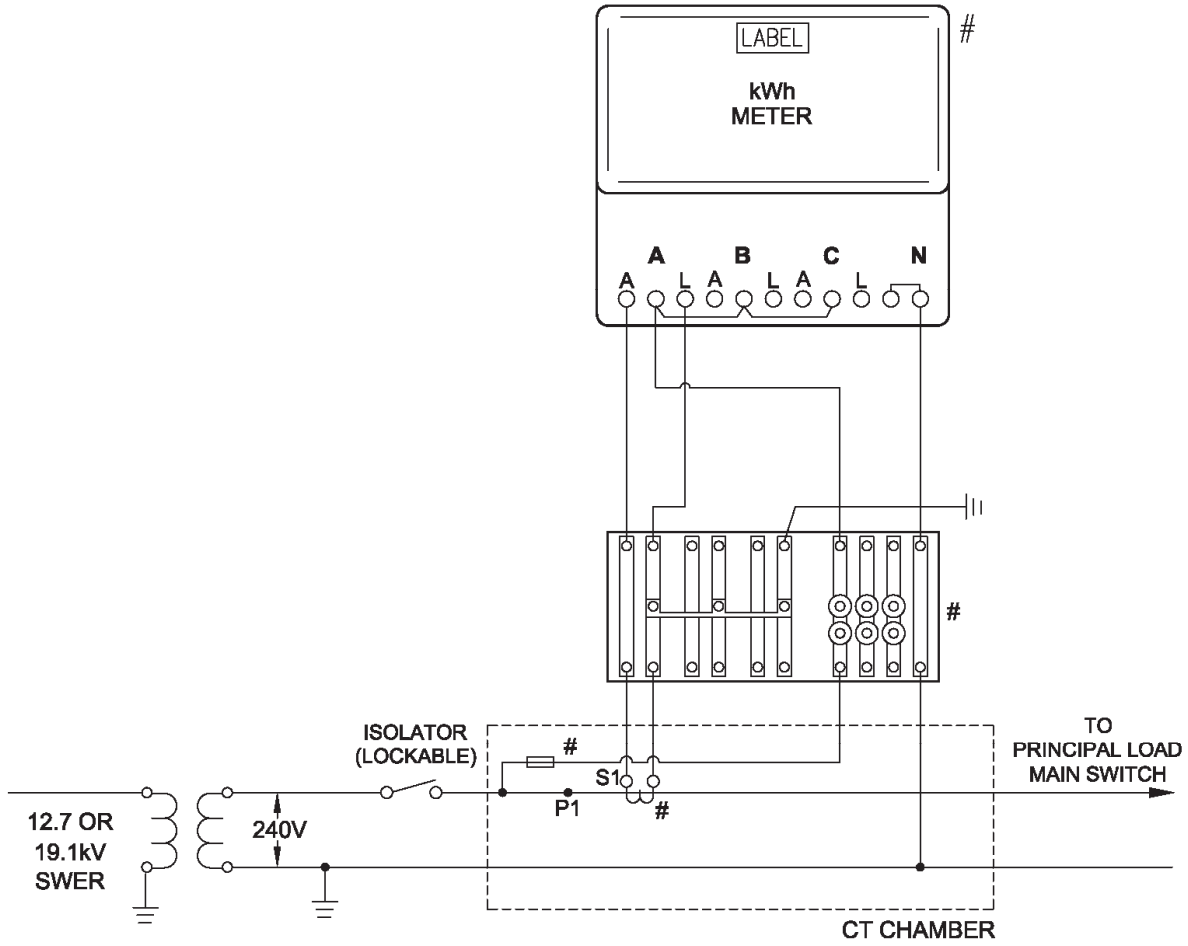

ITEMS SUPPLIED BY METERING PROVIDER

• SOLDERED CONNECTION

NOTES

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. ITEMS TO BE SEALED BY METERING PROVIDER.
   METER, CT, METERING TEST BLOCK AND VOLTAGE CIRCUIT FUSES.
3. CT'S TO BE CONNECTED TO 'A' PHASE TERMINALS OF POLYPHASE CT METER.
4. 'B' & 'C' PHASE VOLTAGE TERMINAL OF METER TO BE BRIDGED TO 'A' PHASE VOLTAGE TERMINAL.
5. LABEL TO BE APPLIED TO METER "METER READER TO IGNORE WARNING CODES." (LABEL ONLY REQUIRED FOR Q4 METERS).

Revision: A	CURRENT TRANSFORMER METERING 240 VOLT SWER CONFIGURATION TYPICAL WIRING DIAGRAM	ECMM - 6.3

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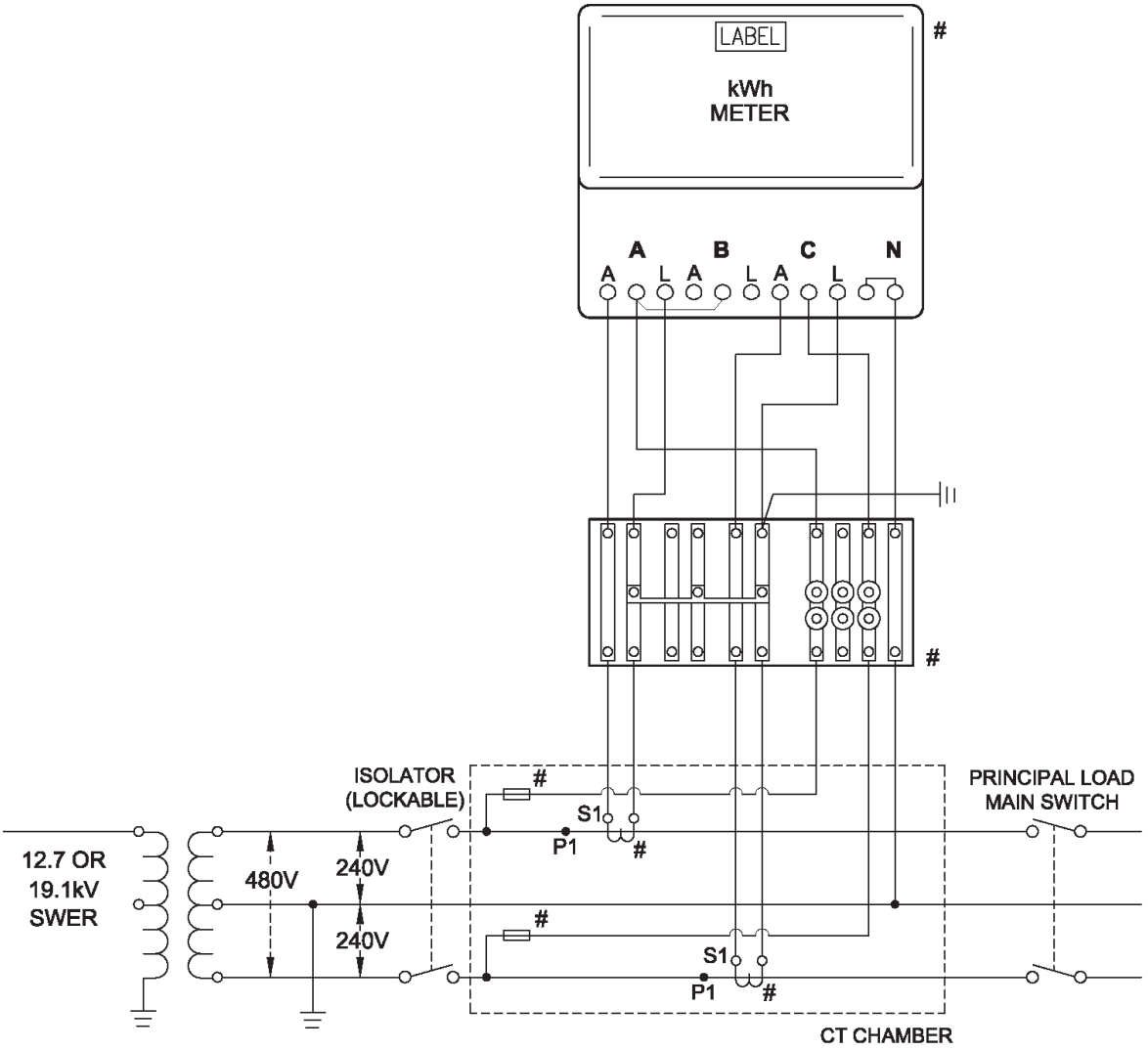

ITEMS SUPPLIED BY METERING PROVIDER

• SOLDERED CONNECTION

NOTES:

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. ITEMS TO BE SEALED BY METERING PROVIDER.
   METER, CT, METERING TEST BLOCK AND VOLTAGE CIRCUIT FUSES.
3. CT'S TO BE CONNECTED TO 'A & C' PHASE TERMINALS OF POLYPHASE CT METER.
4. 'B' PHASE VOLTAGE BRIDGED TO 'A' PHASE VOLTAGE TERMINAL OF METER.
5. LABEL TO BE APPLIED TO METER "METER READER TO IGNORE WARNING CODES."
   (LABEL ONLY REQUIRED FOR Q4 METERS).
6. 480V SUPPLY IS NOT AVAILABLE WITHIN THE ENERGEX DISTRIBUTION AREA.

Revision:		
A	CURRENT TRANSFORMER METERING 480 VOLT SWER CONFIGURATION TYPICAL WIRING DIAGRAM	ECMM - 6.4

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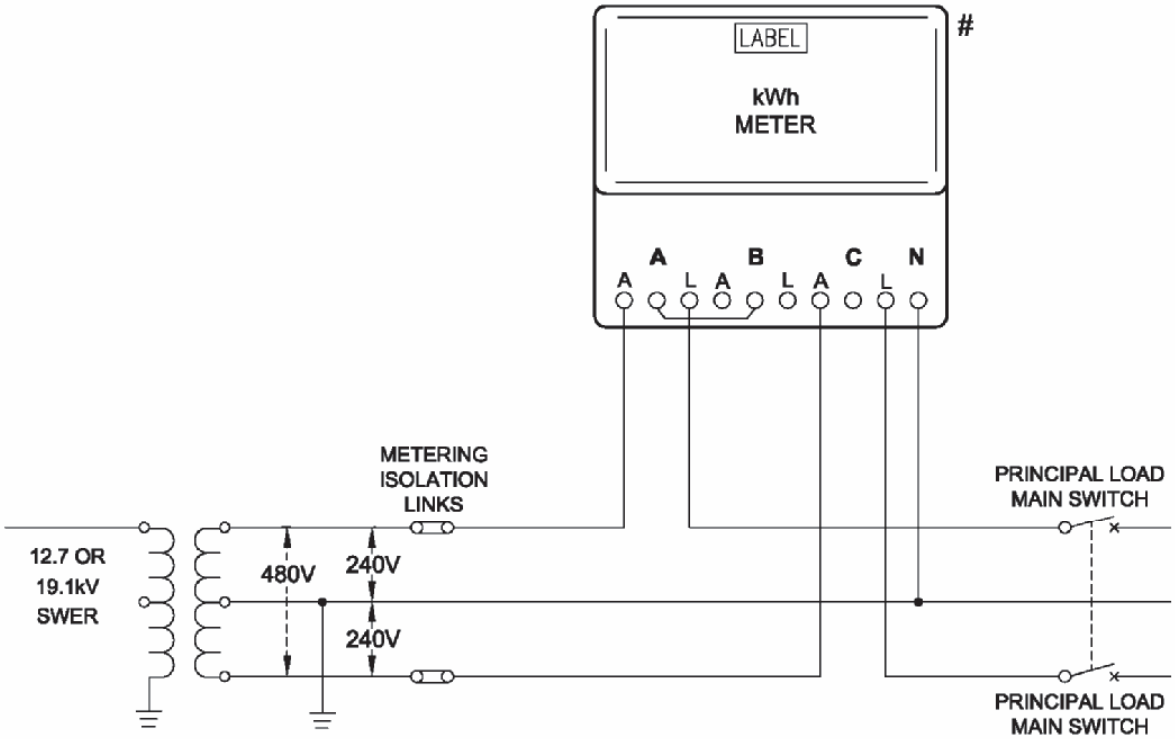
ERGON ENERGY ONLY

WIRING CONFIGURATION FOR INSTALLATIONS USING A POLYPHASE DIRECT CONNECTED METER

METERING ARRANGEMENT SUITABLE FOR IES / SOLAR SCHEME 'FEED IN ' (SUPPLY)



ITEMS SUPPLIED BY METERING PROVIDER.

• SOLDERED CONNECTION

NOTES:

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. METER AND METERING ISOLATION LINKS TO BE SEALED BY METERING PROVIDER.
3. 'B' PHASE VOLTAGE TERMINALS OF METER TO BE BRIDGED TO 'A' PHASE VOLTAGE TERMINAL.
4. LABEL TO BE APPLIED TO METER: "METER READER TO IGNORE WARNING CODES." (LABEL ONLY REQUIRED FOR Q4 METERS).
5. FOR IES/SOLAR SCHEME APPLICATIONS A BI-DIRECTIONAL METER IS REQUIRED TO RECORD IMPORT/EXPORT ENERGY
6. 480V SUPPLY IS NOT AVAILABLE WITHIN THE ENERGEX DISTRIBUTION AREA.

Revision: B	SINGLE PHASE DIRECT CONNECTED METERING 480 VOLT SWER IES CONFIGURATION TYPICAL WIRING DIAGRAM	ECMM - 6.5

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7. INSTALLATION REQUIREMENTS FOR METERS AND CONTROL EQUIPMENT

7.1. General

Customer's ancillary equipment such as surge diverters, voltmeters, phase failure relays etc. shall be connected on the load side of the revenue metering equipment. Customer owned current transformers for energy management are permitted on the line side of revenue metering equipment at multiple tenancy installations.

To facilitate the requirements of the *Electrical Safety Act 2002 and Electrical Safety Regulation 2002* for performing electrical work, and the *Electricity Act 1994 and Electricity Regulation 2006,* supply to the revenue metering equipment for each *customer* is to be capable of being individually isolated. (Refer to Clauses 7.2, 7.3 and 7.15).

7.2. Isolation for Single and Multiple Installations with *Direct Connected Metering*

Direct connected metering shall be installed on the line side of the individual installation's main switches.

7.2.1 Single Installations

A metering isolation link per phase shall be connected to the line side of the metering. This arrangement maintains supply to electronic meters. (Refer to Clause 7.15 and Drawing ECMM 7.1).

Exception:

Where overload protection for the *consumer's mains,* in accordance with AS/NZS 3000 (Wiring Rules), cannot be achieved by the positioning of the installation's main switches on the load side of the metering the follow shall apply:

A metering isolation C or D curve circuit breaker connected on the line side of the metering, and sized for overload protection of the *consumer's mains*, shall be installed on the front of the meter panel. The circuit breaker shall be enclosed in a sealable non-metallic enclosure with a clear cover to allow the *customer* to determine if the circuit breaker is in the open or closed position without removing the cover.

Note: Enclosures that are lockable only are not acceptable.

If the marking on the circuit breaker is not legible when the cover is in place, the open and closed positions are to be identified by additional marking on the enclosure.

Where a C curve breaker is installed, the enclosure shall be fitted with a device that operates in one direction only allowing the circuit breaker to be reset from the tripped position without removal of the enclosure cover.

A permanent indelible label shall be fixed on or adjacent to the circuit breaker enclosure stating the following:

C curve circuit breakers

Push to reset if tripped.

Contact an electrical contractor if this circuit breaker cannot be reset.

Metering isolation only.

D curve circuit breakers

Contact an electrical contractor if this circuit breaker is in the tripped (O) position.

Metering isolation only.

Note: A metering isolation circuit breaker is used in place of a metering isolation link.

7.2.2 Multiple Installations

Where a circuit breaker main switch is installed for overload protection of the *consumer's mains* in accordance with AS/NZS 3000 (Wiring Rules), it shall be connected on the line side of the metering. Metering isolation links are required for individual *customers*. (Refer to Clause 7.15).

7.2.3 Existing Installations

When minor work is being carried out at an existing installation (including a like for like meter change, *AF receiver* change or connection of additional circuits) it will not be necessary to alter the wiring of the meter to before the main switch. (Refer to the notes below).

This change need only be made where there is a major alteration to the metering or switchboard (for example where the switchboard is replaced, when replacing single phase meters with a polyphase meter or connection of additional phase/s). This will include the addition of an isolation link (Refer to Clause 7.2.1).

All meters at the one meter location must follow the same sequence (i.e. be either all "before" or all "after" the main switch/s or any lockable isolator).

Exceptions:

1. Where *direct connected* electronic meters are installed to facilitate a *customer* requested supply change (e.g. controlled supply), additional supplies or installation of an *IES* on an existing single *customer* installation they shall be connected on the line side of the individual installation's switchgear and provision for isolation is required in accordance with Clause 7.2.1.

   In Ergon Energy's Distribution area allowance is also to be made for the metering equipment to be mounted on a hinged panel in accordance with clause 7.6.1

2. On existing multi-tenancy installations where the individual tenancy main switch is connected on the line side of the meters, a new electronic meter shall be connected on the line side of the individual tenancy main switch. A means of isolation in accordance with Clause 7.2.1 must be provided to allow isolation of the electronic meter without interrupting supply to other *customers*.
3. On existing single phase multi-tenancy installations utilising plug-in meters, the need to fit isolation link/s is not required in situations where a replacement plug-in meter is to be used. These include a single phase tenancy with an Inverter Energy System (IES) or a tenancy with Time of Use metering (TOU)

   Note: For a multi-phase tenancy with plug-in meters, provision for the installation of a Poly-Phase meter shall be made where an Inverter Energy System (IES) is installed. This will include the addition of isolation links (refer to Clause 7.2.1)

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Notes:

1. Where the *distributor's* service fuse is greater than 100A, fault current limiting devices complying with AS/NZS 3000 (Wiring Rules), are required to protect any *direct connected meters*. Fault current limiting devices shall be installed within the first 500 mm of the take off point. (Refer to Section 9, Drawings ECMM 9.1-1 and 9.1-2).
2. Standard practice in multiple tenancy *direct connected metering* installations, where the service fuse protection is greater than 100A, is to install a 100A fuse in the metering isolation link in place of the solid link. Where fuses are installed, the *metering provider* will provide the fuse and place a label on the panel adjacent to the metering isolation links stating: "WARNING - The metering isolation links have been fused for protection of Metering Provider Equipment".

7.3. Isolation for Current Transformer Installations

Refer to Section 9 for the isolation arrangements applicable to current transformer metered installations.

7.4. Accommodation for Metering and Control Equipment

The *customer* shall provide and maintain at their expense, suitable space, housing, mounting and connecting facilities to accommodate meters and control equipment for each supply arrangement (e.g. general and *controlled supplies*).

Unless otherwise specified and agreed with the *metering provider,* the minimum space requirements for *high voltage metering* panels shall be as specified in Section 11.

7.5. Housing of Meters and Control Equipment

7.5.1 Where meters and control equipment are erected in a position exposed to the effects of the weather, direct sunlight, corrosive atmosphere and the like they shall be enclosed in a suitable meter enclosure.

Meters, control equipment and their enclosures shall be protected from mechanical damage, by either their location or the manner of mounting.

Note: Where a meter enclosure is installed on a temporary structure, the supporting structure shall be mechanically sound. Where the temporary structure is used for building purposes it shall comply with the requirements of AS/NZS 3012 (e.g. includes the connection of permanent supply for domestic building purposes in a URD estate).

7.5.2 Where meters and control equipment are accessible only from the outside of a building, they shall be enclosed in a suitable meter enclosure mounted on, or recessed into the outside wall of the building. Meter enclosures shall not be installed where they protrude or open across a property boundary.

Exception: Meter enclosures mounted on the front boundary may open towards the footpath. It is recommended that meter enclosures mounted in these positions be locked. (Refer to Clause 7.10 for metering lock details).

On a single domestic installation a meter enclosure shall comply with either: "Specification for Metallic Enclosures for Meters in Domestic Premises" *ECMM* Appendix A, or (at the discretion of the *metering provider)* another type of metering enclosure complying with AS 6002.

On a single *direct connected metering* installation, the minimum meter enclosure dimensions will comply with the dimensions listed in Appendix A.

Where it is necessary to install a new meter enclosure on an existing domestic installation, compliance with this standard is also required. The location of any newly installed or relocated meter enclosure shall comply with Clause 7.7.

7.5.3 Where a meter enclosure used to house revenue metering equipment is erected on a pole, it shall be constructed of an approved material (not timber), be adequately fixed in position and where necessary, suitably treated against corrosion.

7.5.4 All metallic meter enclosures shall be earthed. Where double insulation is maintained throughout the meter enclosure (in accordance with the requirements of AS/NZS 3000 (Wiring Rules)), earthing is not required.

7.6. Mounting of Meters and Control Equipment

7.6.1 All metering, control equipment and Metering Isolation Links must be mounted on a hinged panel. All meter panels shall be side hinged on a vertical axis so that the metering and control equipment always remains in the vertical plane (Refer to Drawings ECMM 7.2, 7.3, 7.4, 7.5, 7.6, 7.7 and Appendix A).

Note: Fixed meter panels are not acceptable

7.6.2 Meter panels shall be of a durable, non-conducting fire resistant material with low water absorption properties. Alterations requiring a new meter panel shall comply with the above. Existing meter panels in good condition do not require replacement.

7.6.3 Screws used to mount and fix equipment on insulated meter panels shall be fit for purpose. Where mounting hardware protrudes through the panel and can be contacted, a non conducting bolt/screw (e.g. nylon or plastic) shall be used.

Note: Metal screws with needle points and self drilling tips are not permitted. The insulating of metal screws using silicone or other material is not permitted.

7.6.4 The panel within the meter enclosure should be not more than 300 mm from the front of the meter enclosure.

7.7. Position of Meters and Control Equipment

7.7.1 General

Meters and control equipment shall be positioned so that they are not subjected to mechanical damage, vibration, high temperature or other environmental situations that might affect their correct operation (e.g. exposure to direct sunlight). Meter reading windows in meter enclosures are not permitted and where security of a meter enclosure is necessary, a metering lock must be purchased to allow access. (Refer to Clause 7.10).

The *customer* shall provide safe and ready access so that meters and control equipment may be fixed, read, tested, adjusted and removed without difficulty at any reasonable time but generally between the hours of 8.00am to 5.00pm Monday to Friday. For minimum space to allow access refer to AS/NZS 3000 (Wiring Rules).

Where building alterations or similar works are carried out to *premises* which results in the metering equipment no longer being in a position that is suitable to the *metering provider* (refer to Clause 7.7.2 for unsuitable locations), the *customer* shall, at their expense, relocate the metering equipment to an acceptable position complying with Section 7.

Unless otherwise approved by the *metering provider*, or as varied by Clause 7.8, all meters and control equipment supplied for any one installation (as defined in AS/NZS 3000 (Wiring Rules)) shall be located in one readily accessible position, preferably on an outside wall at the front of the building.

Current transformer meters should be installed towards the front of the building on a readily accessible outside wall.

Note: Where a property or building is of a type that may be subdivided, the meters and wiring should be located in an area that would be set aside as *common property* or within each individual lot. (Refer to Clauses 7.7.2 to 7.9).

7.7.2 Unsuitable Locations

The following locations are unsuitable for the installation of metering equipment:

(a) Within or above any pool zone as defined in AS/NZS 3000 (Wiring Rules).

(b) Locations where the meter reader's only point of access is through the fenced area around the pool.

(c) Within any hazardous area defined in AS/NZS 3000 (Wiring Rules) or within a gas emitting device (gas meter regulator) exclusion zone defined by AS 5601-2004 (Australian Gas Code). In particular, *electrical contractors* should be aware of the hazardous areas associated with exchange or in-situ fill LPG gas cylinders. (Refer to AS/NZS 3000 (Wiring Rules) and AS/NZS 2430.3.4).

(d) Over stairways or ramps, in narrow passageways, toilets or fire isolated stairways.

(e) In vehicle docks, driveways, factory walkways etc. where the equipment, or a person working on the equipment would not be adequately protected.

(f) In close proximity to machinery.

(g) Locations where exposure to fumes, dust or dampness may result in unsatisfactory working conditions.

(h) In positions where the ambient temperature exceeds 50^0 C (e.g. boiler rooms).

(i) In areas with insufficient light.

(j) In confined spaces.

(k) In areas where the integrity of a security system will be affected by entry of the *metering provider's* personnel, (refer to Clause 7.10), or where access is normally restricted for health or other reasons.

(l) In multiple installations without a remote meter reading arrangement, the meter position is not to be situated within any lockable portion of an individual tenancy (i.e. shall only be located in a common area).

(m) Within enclosed carports or verandahs.

(n) In areas enclosing dogs.

(o) Behind a property perimeter fence without an adjacent gate. (Refer to Clause 7.9 for meter positions on domestic properties).

(p) In areas subject to varying high intensity magnetic fields. (Refer to Clause 9.11 for current transformer meter panels in the vicinity of heavy current carrying conductors).

(q) On the *distributor's* works. (For exception details refer to Clause 5.9).

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7.8. *Unmetered* Submains / Meter Positions

7.8.1 Unmetered Submains - General

Details of the proposed meter positions, *unmetered* submains and their circuit protective devices shall be submitted to the *metering provider* for approval before their installation.

Exception: Approval is not required where the *unmetered* submains comply with Clauses 7.8.3. to 7.8.5.

Voltage drop on *unmetered* submains shall not exceed 2.5% of the supply voltage (voltage drop calculations must be included with the submission). (Refer to page 1 for contact details).

7.8.2 Meter Positions - General

Unless otherwise approved or varied by clauses 7.8.3 to 7.8.5, all meters and control equipment supplied for one meter installation (as defined in AS/NZS 3000 (Wiring Rules)) shall be located in one readily accessible position.

Installations with multiple metering points as detailed in 7.8.3 and 7.8.4 are to have community metering (where required) located on the main switchboard.

7.8.3 High Rise Buildings

For buildings up to four floors, a single meter position on common property on the ground floor is approved.

For high rise buildings in excess of four floors, one meter position on every floor is approved.

7.8.4 Shopping Centres

For shopping centres, other than high rise buildings complying with Clause 7.8.3 above, an additional metering point for every twelve *customers* will be permitted.

7.8.5 Community (Group) Title and Cluster Developments

In general the *distributor* will provide one *point of supply* to a community title scheme or cluster development installation. Unless otherwise approved by the *metering provider*, all community metering shall be located at one position. Where additional Community Metering points are approved, each shall be treated as a separate *NMI* (Refer to Drawing ECMM 7.8).

Where a cluster or community title scheme development consists of a number of multi-tenanted buildings, additional meter position/s located on common property may be permitted.

The following meter positions will also be acceptable:

(a) Overhead Reticulation

(i) The main switchboard located on *common property* and all metering equipment installed at this position.

(ii) The main switchboard and the first metering point located on *common property* and subsequent metering points located on *common property* or as otherwise approved by the *metering provider*. (Refer to Clauses 7.7 and 7.9).

(b) Underground Reticulation

Arrangements given in either (i) or (ii) above: or

The individual *consumer's mains* (for each unit) installed on *common property* and connected to the *distributor's* reticulation with the metering equipment located at the unit. (Refer to Clauses 7.7.1; 7.7.2 and 7.9).

Note: Where more than 3 sets of *consumer's mains* are to be connected to a distributor's pillar, approval must be obtained from the *distributor*

Note: A general arrangement is for twelve *customers* or units per metering point or as otherwise approved by the *metering provider*.

The *ENERGEX* Subdivision Standards - Developer Design & Construct Estates Manual provides further information regarding Community Title and Cluster Developments in the *ENERGEX* distribution area. It is available for download on the *ENERGEX* website.

7.9. Domestic Properties

On domestic *premises* a meter position suitable to the *metering provider* shall satisfy the following criteria:

(a) Unless otherwise approved in writing by the *metering provider*, meters shall be erected on the side of the *premises* facing a street from which there is pedestrian access or within the first 2 m along an adjacent side of the *premises*. (Refer to Drawing ECMM 7.9).

(b) Meters shall not be located behind any fence, other than the property perimeter or front fence.

Where access to meters is through locked gates in the perimeter or front fence, the *distributor's* metering lock purchased from an authorised locksmith must be installed. The lock must be accessible from outside the gate. (Refer to Clause 7.10).

Note: Key/security card boxes or dual locking bars are acceptable.

(c) On domestic rural or *urban* properties greater than half a hectare, the metering equipment shall be situated in a readily accessible position in accordance with (a) and or (d) of this clause.

(d) For acreage and farm properties the metering equipment shall be accessible by motor vehicles.

Note: The preferred meter position is at the main residence, central meter position or at the front property boundary.

7.10. Metering Locks

Where the *metering provider* agrees to meters being erected in an enclosure within an area which may be locked for security reasons, or where meters may be subject to vandalism, the *distributor's* metering lock must be purchased and installed to permit access. (Refer to page 1 for purchasing details and Drawing ECMM 7.10 for lock types).

Where the *distributor's* metering lock is installed, all tenants who require access to the meter panel shall be provided with such access.

Note: If the *distributor's* personnel are requested to open the metering lock for tenant access, the *customer* will be charged a call out fee.

Metering locks shall not be used on a garage door, verandah door or similar doors that provide access to private areas. (Refer to Clause 7.7.2 and Drawing ECMM 7.10).

Where special circumstances exist, remote read metering may be installed. The *customer* will be required to pay any associated costs. Contact the *metering provider* for details.

7.11. Space for Meters and Control Equipment

Item A.3 of the "Specification for Metallic Enclosures for Meters in Domestic Premises" in Appendix A, specifies minimum space requirements for metering equipment on domestic *premises*.

Clause 9.9 specifies minimum space requirements for meter panels for low voltage *current transformer metering*.

Minimum space requirements for mounting of meters and control equipment are shown in TABLE 7.1.

TABLE 7.1

Meter and AF Receiver Details	Height (mm)	Width (mm)	Depth (mm)	Approx. Weight (kg)
Single Phase Single Element	240	150	135	1.5
Single Phase Two Element	255	150	130	1.5
Polyphase Electronic	285	180	135	2.1
AF Receiver	190	110	110	0.5
Time Switch	230	115	110	1.6
Metering Isolation Link	90	45		
Min clearance between metering equipment 25mm (refer Clause 7.13)				

7.12. Mounting Height of Meters and Control Equipment

Unless otherwise approved in writing by the *metering provider*, the top of any metering equipment shall have a maximum height of 2000mm above floor or ground level. The bottom of the meter, relay, time switch or item of metering equipment shall not be less than 900 mm above floor or ground level when not installed in an enclosure or dedicated switch room or meter room. This height may be reduced to 700mm (500mm for metering isolation links) above floor or ground level when installed within an enclosure or dedicated switch room or meter room.

Where the *customer* is required to provide a platform to access a meter installation, it shall be designed to AS 1657, and be certified by a *RPEQ* that the structure is suitable for the application. A certificate of approval shall be submitted to the *distributor* prior to connection of supply. Where meters and switchboards are installed on service poles in flood prone areas, the platform shall be self-supporting, permanently mounted and designed to support a minimum 120kg.

The service pole shall not be used to support any platform structure, and any step-type ladder access shall be clear of any fences or sharp objects that may be considered a fall hazard.

For clearances in front of the metering enclosure doors refer to AS/NZS 3000 (Wiring Rules) (i.e. minimum clearances of 600mm).

For existing installations where access is considered unsafe, the *metering provider* may refuse to read the meters until the unsafe condition has been rectified by the *customer* or may repair the access at the customer's cost. (*Electricity Regulation 2006*).

7.13. Clearance around Meters and Control Equipment

A minimum clearance of 25mm is required around any item of metering or control equipment however this clearance may be reduced where 25mm clearance is available around the sealing points to allow for the removal and replacement of the seals or covers.
The minimum clearance around the ends of metering isolation links shall be 40mm minimum.
Exception: Metering isolation links associated with each NMI can be mounted side by side with no clearance between provided the minimum clearance around the ends of metering isolation links is 40mm minimum

7.14. Connecting Facilities for Meters and Control Equipment

7.14.1 Meter Neutral Conductors

The metering neutral shall be connected to the main neutral in such a manner that it cannot be disconnected or removed, e.g.

(a) Soldered or crimped to the main neutral;

(b) A flag lug under the main neutral connection. Slotted lugs shall not be used;

(c) A sealable terminal or bolt on the neutral link where -

  (i) the *consumer's mains* are a busway or busbar arrangement;

  (ii) the installation main switchboard is supplied by more than one *point of supply* and a bus-tie arrangement is in place (the *consumer's mains* neutrals shall be connected to a common neutral link/bar);

(d) Where the main neutral conductor is 25 mm^2 or larger a sealable terminal may be used;

(e) Under a stud fitted, with a suitable nut, that is drilled and tapped into the *consumer's mains* neutral lug, provided the arrangement can be sealed.

Note: In domestic installations where parallel *consumer's mains* are used the meter neutral conductor shall be soldered to one conductor only.

7.14.2 Accessibility of Neutral Connections

On heavy current switchboards (Refer to AS/NZS 3000 (Wiring Rules)) the main neutral and MEN connections to the busbar shall be located in an accessible position with a minimum of 600mm clearance from exposed live parts. If a minimum clearance of 600mm cannot be achieved, the use of a suitable barrier or location within a chamber separate from that of the main switch or other exposed live parts is acceptable.

The arrangement must allow the main neutral and MEN connections to be safely accessed without isolating the supply to the switchboard or moving other cables. (Refer to AS/NZS 3000 (Wiring Rules)).

The metering neutral connection is to be readily accessible and shall not be located behind a panel where access requires isolation of supply. (Refer to Clause 9.14.8 for meter neutral label).

7.14.3 Connection of Direct Connected Metering

The meters shall be connected as shown in Section 8, Drawing ECMM 8.1, so that the *controlled load* supply may be installed and removed without interference to the principal supply meter.

The neutral conductor of the *consumer's mains* is not to be joined or looped through the terminals of a revenue meter or metering link.

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Not more than one active conductor may be connected to any one line side terminal of a *direct connected meter*, except where parallel conductors no larger than 10mm² are used.

Supply to a secondary (*controlled load*) meter shall be from the load side of the metering isolation link. Looping of active conductors from a *controlled supply* meter to any other meter is not permitted.

Two conductors may be connected to the load terminal of a *controlled load* meter in lieu of a soldered connection when connecting two switches of a multi-switch *AF receiver*. (Refer to Drawing ECMM 8.2). Looping between *AF receivers* is not permitted.

Looping of active conductors on the line side between meters is not permitted. Where more than two active conductors are required to supply *direct connected meters* or where a circuit breaker is installed on the line side of the metering in accordance with Clause 7.2.1, an active meter link may be required to be installed. (Refer to Clause 7.16).

All meter wiring shall be supplied and installed by the *electrical contractor* and suitable holes provided in the meter panel (ready for connection by the *metering provider*). Cable tails through meter panels should be a minimum 150mm for connection and termination to metering equipment.

All metering and control equipment shall be back-wired.

Notes:

1. A slotted arrangement for cable entry to the meters may be used.
2. There will be transitional periods where integrated and electro-mechanical meters and relays will be used. The *electrical contractor* shall prepare wiring and suitable holes for fitting of *integrated meters* and shall ensure wiring lengths are sufficient for both meter types. The *metering provider* will alter the metering arrangement if required.

Where additional metering equipment is to be installed on an existing installation, care must be taken to ensure any additional meter wiring provided for later installation of meters, is suitably terminated.

Taping of conductors on the front of a meter panel does not satisfy the requirements of AS/NZS 3000 (Wiring Rules) as a suitable means of termination.

7.15. Metering Isolation Links

To individually isolate the revenue metering equipment for each *customer*, the electrical contractor shall install suitable metering isolation links. (Refer to Drawing ECMM 7.1).

Exception: Metering isolation links are not required where a circuit breaker is installed in accordance with Clause 7.2.1.

Metering isolation links shall be installed in accordance with the following:

(a) Meter isolation links shall be clear cased type that comply with the relevant Australian Standard, sealable, back wired, fitted with a tubular link and installed on the line side of all *direct connected metering* equipment; and

(b) All metering isolation links on a metering panel shall be connected in the same line - load sequence; and

(c) The metering isolation links shall be mounted horizontally or vertically on the front of the metering panel and if not obvious, clearly labelled to indicate the meter and portion of the installation that they control. (Refer to Drawings ECMM 7.1; 7.2 and 7.4). Clearance around the ends of metering isolation links shall be 40mm; and

(d) The load through a metering isolation link shall not exceed 125A. In multiple supply applications (e.g. general and *controlled supplies*), where the load exceeds 125A, additional metering isolation links shall be required. Where a 100A fuse is used to replace the solid link (Refer to Clause 7.2.3) the maximum load through the meter isolation link shall not exceed 100A; and

(e) On multiple installations metering isolation links shall be provided for each *AF receiver* and installed on or adjacent to the relevant meter/metering equipment; and

(f) For *customers* with three phase supply the metering isolation links are to be grouped together and if not obvious, permanent labelling must be applied to the meter panel to show the meter(s) and installation that they control.

In Energex's distribution area where metering isolation links are fitted on an existing meter panel with surface wiring a front wired metering isolation link suitable for this purpose is acceptable.

7.16. Active and Neutral Meter Links

Where common *consumer's mains* are installed for the purpose of supplying more than one *customer*, meter active and neutral links mounted on the rear of the meter panel shall be used. Where there is insufficient space for mounting on the rear of the meter panel, then an alternative position may be used provided access to meter links is not obstructed by any structure or wiring within the switchboard.

Note: It is acceptable to loop from the spare line side terminal of the meter isolation link provided the rating of the link is not exceeded and it is compliant with clause 3.2.2

Where active and neutral meter links are not mounted on the rear of the meter panel and the material on which they are mounted is conductive, they shall be mounted on insulating material with low water absorption properties that will extend past the live parts of the link by a minimum of 25mm in all directions. This mounting arrangement is not required where the link has been specifically designed and type tested for installation onto metal surfaces. A permanent label is required on the front of the meter panel to indicate the location of the meter active and neutral links.

Active meter links may be required to facilitate the ease of connecting large cables to metering isolation links in multi-tenancy installations. (Refer to Section 8 Drawings ECMM 8.7 (*ENERGEX*) or 8.14 (*Ergon Energy*), and Section 9 ECMM 9.1-2).

Active and neutral meter links shall be identified as such and marked to identify which meter is fed from each out going circuit of the meter link.

Active meter links shall -

(a) incorporate a separate connecting device for the incoming and each outgoing circuit; and

(b) consist of tunnel terminals using either of methods (i); (ii) or (iii) for termination of the conductors.

  (i) Two screws shall be provided for each terminal; or

  (ii) One screw, the outside diameter of which is not less than 80% of the tunnel diameter; or

  (iii) One screw, which is arranged so that the conductor is clamped by suitable ferrules or plates in direct contact with the conductor.

Where active or neutral meter links are used, they must be sealable or, where this facility does not exist (for larger sized *consumer's mains*), the links must be installed within a suitable dedicated enclosure fitted with a sealable cover.

7.17. Size of *Direct Connected Meter* Wiring

The meter wiring for *direct connected metering* shall be PVC insulated copper cable from these standard sizes:

4mm^2	7/0.85
6mm^2	7/1.04
10mm^2	7/1.35
16mm^2	7/1.70
25mm^2	19/1.35

Active and load meter wiring for *direct connected metering* shall not exceed 25mm². (Refer to Clause 7.14.3 for parallel conductors connected to meter terminals).

The wiring from a *controlled supply* meter to an *AF receiver* and all meter neutral wiring shall not exceed 6mm²

10mm², 16mm² and 25mm² insulated flexible cables are approved for use, provided that approved soft-form un-insulated bootlace pins (end sleeves), with a minimum length of 20mm, are securely crimped onto the cable tails by the *electrical contractor*. An appropriate crimping tool must be used. (Refer to AS/NZS 3000 (Wiring Rules)).

Compressed (compacted) or hard drawn conductors shall not be used as meter wiring unless of a type with only 10% compaction and up to V90 insulation (must be flexible enough to bend into the meter terminals).

Aluminium cables are not permitted for connection directly into meter terminals.

Aluminium cables are not suitable for connection directly into Metering Isolation Link terminals unless fitted with a suitable means of termination, such as a soft-form bi-metallic sleeve or ferrule that is compatible with the Metering Isolation Link terminal metal.

Where cables of these types are used as *consumers mains*, they shall comply with the requirements of the electrical component/cable manufacturers and AS/NZS 3000, particularly in regard to termination and bending.

7.18. Phase Identification

To ensure correct phase sequencing of polyphase meters, the individual conductors of 3 phase consumer mains shall be clearly identified at both ends by colour coding of the conductor insulation (e.g. red, white and dark blue). This identification may be achieved by installation of 150mm minimum of colour coded sleeving installed at the conductor terminations (e.g. at the service pillar, mains connection box, transformer terminals, switchboard/metering panel etc). Insulation tape is not an acceptable means of identification.

7.19. Sealing of Metering Equipment

The *metering provider* will seal all the metering equipment and may seal cubicles or panels which house revenue metering equipment, or *unmetered* sections of a switchboard. It is an offence to break or interfere with any seal unless authorised by the *metering provider*.

Meters, control equipment, metering isolation links, metering neutral links, metering active links, voltage circuit fuses and contactors associated with the metering, and which are required as a condition of a supply arrangement (e.g. *controlled supply*), are typical of equipment that requires sealing.

The *customer* shall make provision for the sealing of all *current transformer metering* panels, dedicated current transformer and voltage transformer chambers and HV metering panels.

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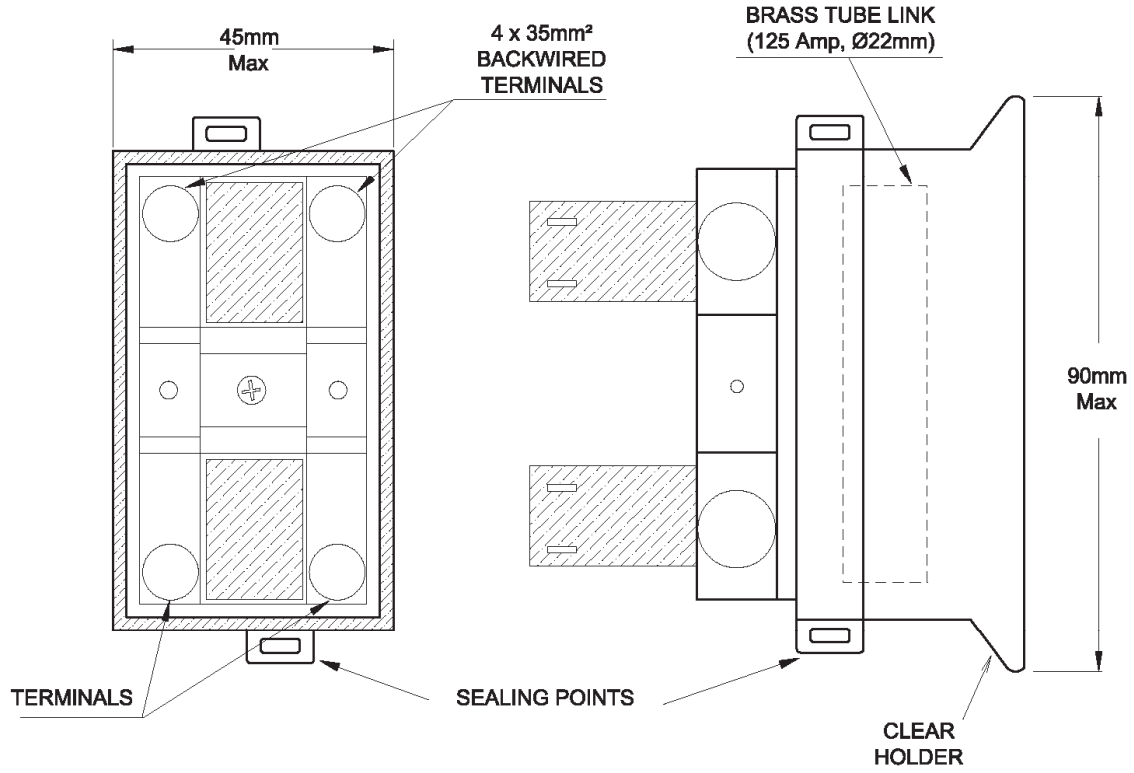
METERING ISOLATION LINK



LINK BASE **SIDE VIEW**

NOTES:

1. USE APPROVED METERING ISOLATION LINK, SUPPLIED WITH A 125 AMP BRASS TUBE LINK AND INSTALLED ON THE FACE OF THE METERING PANEL.
2. FOR POLYPHASE METERING - THE THREE METERING ISOLATION LINKS ARE TO BE GROUPED TOGETHER.
3. IT IS RECOMMENDED THAT THE METERING ISOLATION LINKS ARE MOUNTED HORIZONTALLY UNDERNEATH THE METER.
4. CLEARANCE OF 40mm TO BE LEFT AT EACH END OF LINK TO FACILITATE SEALING.

Revision: A	METERING ISOLATION LINK DIRECT CONNECTED METERING	ECMM - 7.1

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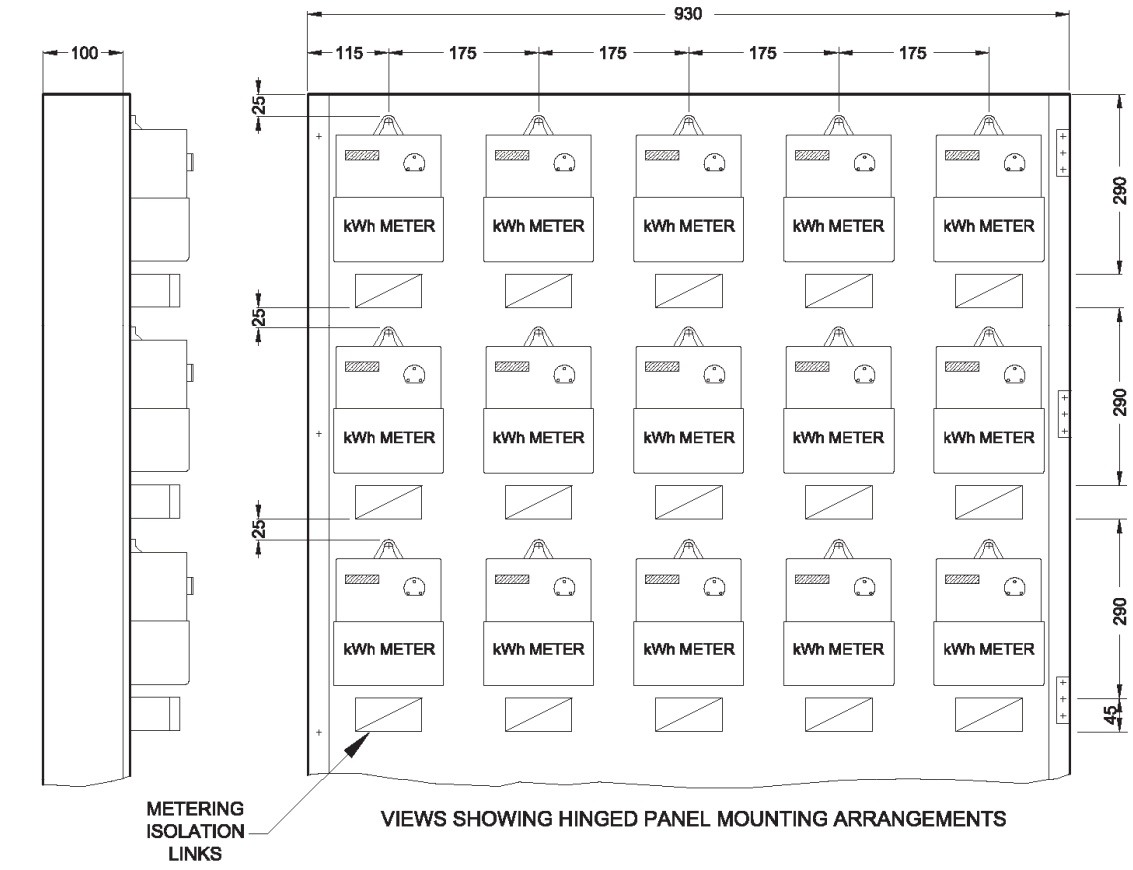
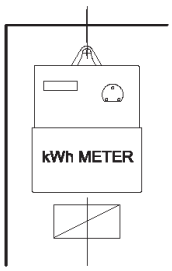


VIEWS SHOWING HINGED PANEL MOUNTING ARRANGEMENTS



(HINGED FRAME FOR INTERNAL USE)

NOTES:
1. ADDITIONAL BRACING MAY BE REQUIRED TO PROVIDE SUFFICIENT STRUCTURAL SUPPORT WHEN PANEL IS OPENED.
2. PANELS ARE TO BE BACK WIRED ONLY. (NOTE: DIMENSIONS FOR SINGLE PHASE METERS)
3. USE ONLY APPROVED METERING ISOLATION LINKS.

Revision:		
A	HINGED METER PANEL ARRANGEMENT SINGLE PHASE, SINGLE SUPPLY METERS ONLY (BACKWIRED) - TYPICAL PANEL LAYOUT	ECMM - 7.2

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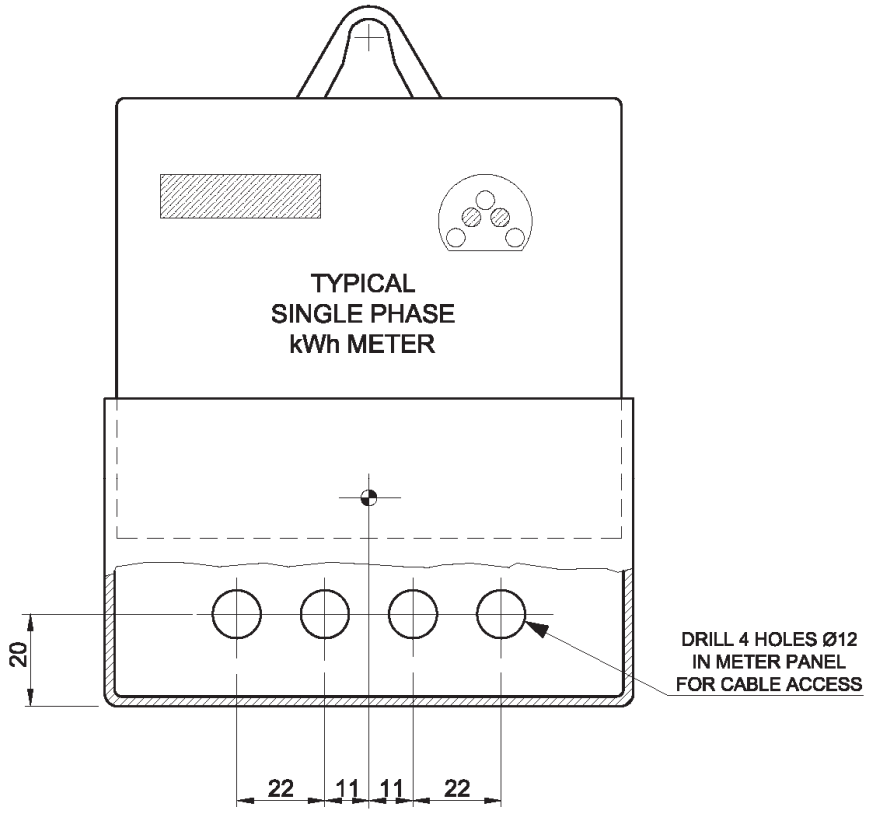

Revision:		
A	SINGLE PHASE kWh METER DRILLING DETAILS FOR CABLE ACCESS	ECMM - 7.3

Joint document between ENERGEX and Ergon Energy
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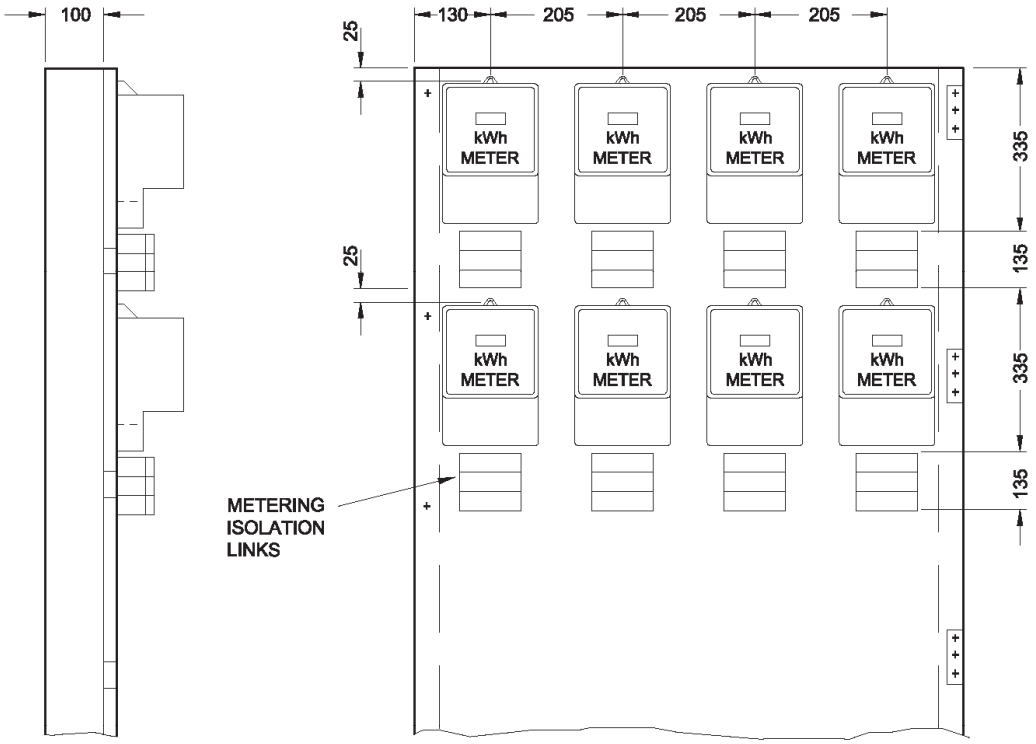
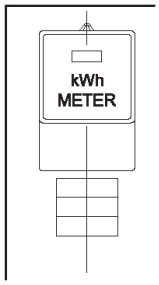


VIEWS SHOWING HINGED PANEL MOUNTING ARRANGEMENTS



NOTE:
LINKS MOUNTED HORIZONTALLY TO FACILITATE SEALING PURPOSES.

(HINGED FRAME FOR INTERNAL USE)

NOTES:
1. ADDITIONAL BRACING MAY BE REQUIRED TO PROVIDE SUFFICIENT STRUCTURAL SUPPORT WHEN PANEL IS OPENED.
2. PANELS ARE TO BE BACK WIRED ONLY. (NOTE: DIMENSIONS FOR POLYPHASE METERS)
3. USE ONLY APPROVED METERING ISOLATION LINKS.

Revision: A	HINGED METER PANEL ARRANGEMENT POLYPHASE METERS ONLY (BACKWIRED) TYPICAL PANEL LAYOUT	ECMM - 7.4

Joint document between ENERGEX and Ergon Energy
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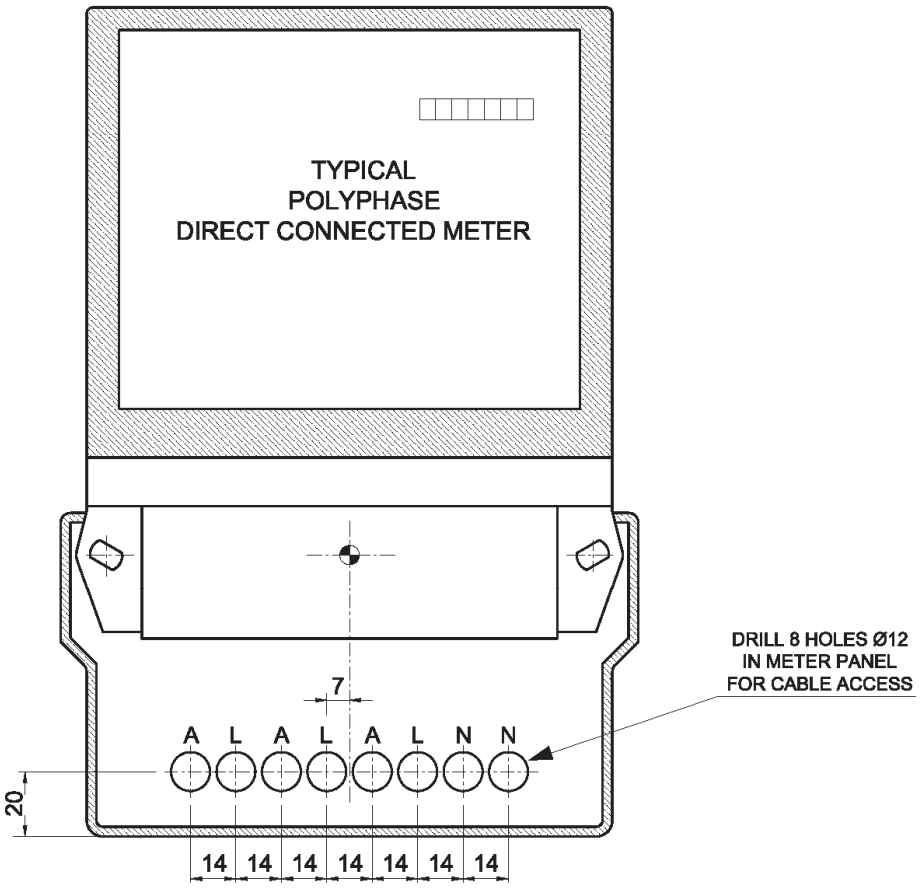

Revision: A	POLYPHASE DIRECT CONNECTED METER DRILLING DETAILS FOR CABLE ACCESS	ECMM - 7.5

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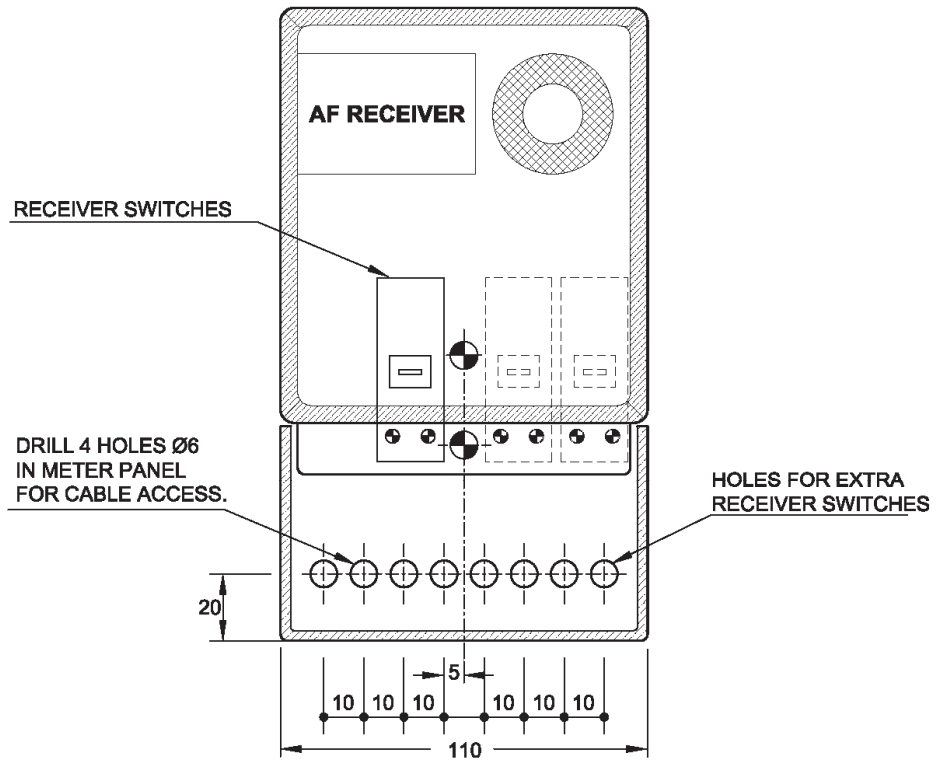

Revision: A	AF RECEIVER DRILLING DETAILS FOR CABLE ACCESS	ECMM - 7.6

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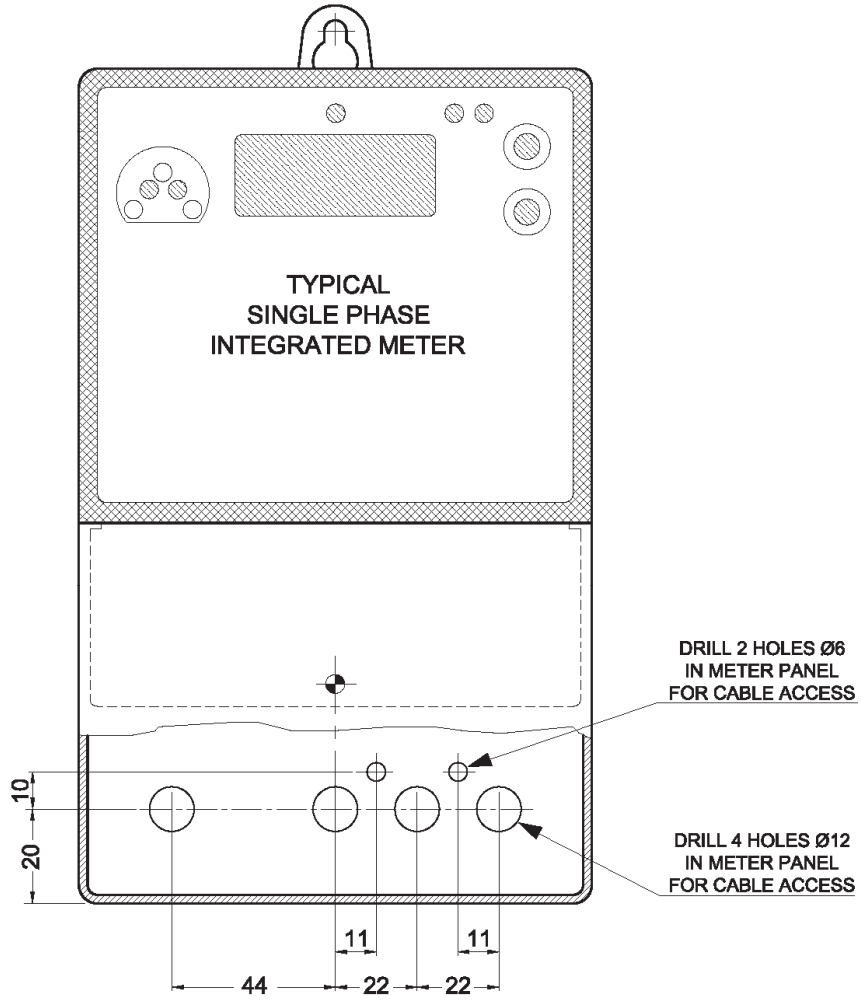

Revision:		
A	SINGLE PHASE kWh METER (INTEGRATED) DRILLING DETAILS FOR CABLE ACCESS	ECMM - 7.7

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OH/UG

	Community Title Scheme / Multi unit dwellings	Customer Reticulated community title schemes	Distributor's Reticulation community title schemes	Single unit dwellings
Meter Position	1 meter position on common property	The MSB and first meter position on common property plus 1 additional Meter position for every additional 12 customers if required	1 meter position per dwelling fed from the point of supply	1 meter position per unit
Point of Supply	1 Point of supply per community title scheme	1 Point of supply per community title scheme	1 Point of supply per unit	1 Point of supply per unit
	refer DWG A (I), (II).	refer DWG C	refer DWG D	refer DWG E

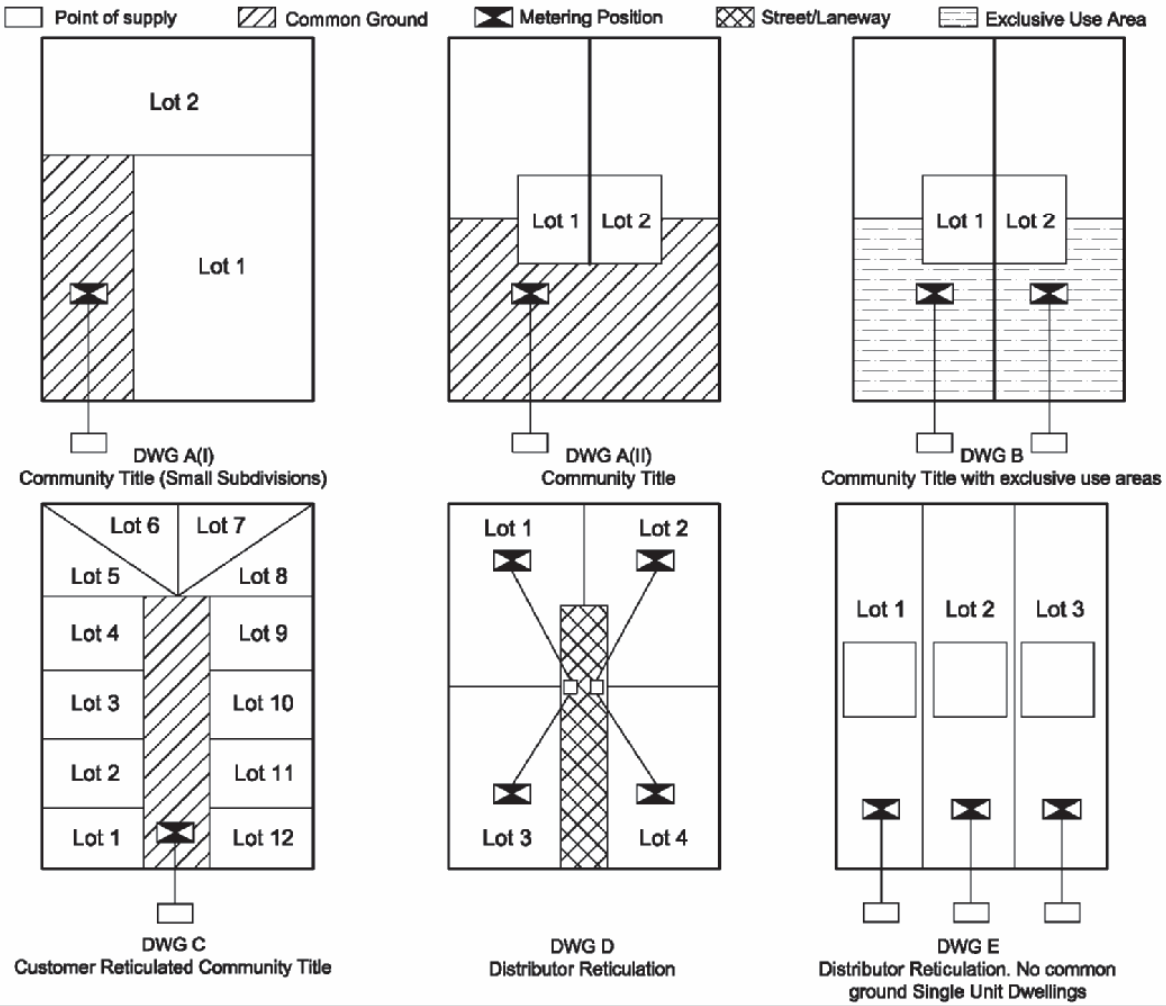
NOTES:

1. Common Property made exclusive use. DWG B
   Where the area of common property has been designated for the exclusive use to each lot, ie. Fenced off and prohibiting access to other owners or occupiers to their metering position, service line and/or consumers terminals.
   A separate point of supply & metering position shall be required for each unit and conform to Clause 7.7.2.

   Under no circumstances shall the service line or consumers mains be permitted to cross or enter the area of exclusive use in order to service another lot.

2. Dual occupancy developments shall only be entitled to have one point of supply and one metering position.ie. Granny flats, sheds, dependant persons accommodation.

Note: Point of supply and metering positions shown on diagrams are indicative only.



Revision: B	LOCATION OF METERING PANELS	ECMM - 7.8

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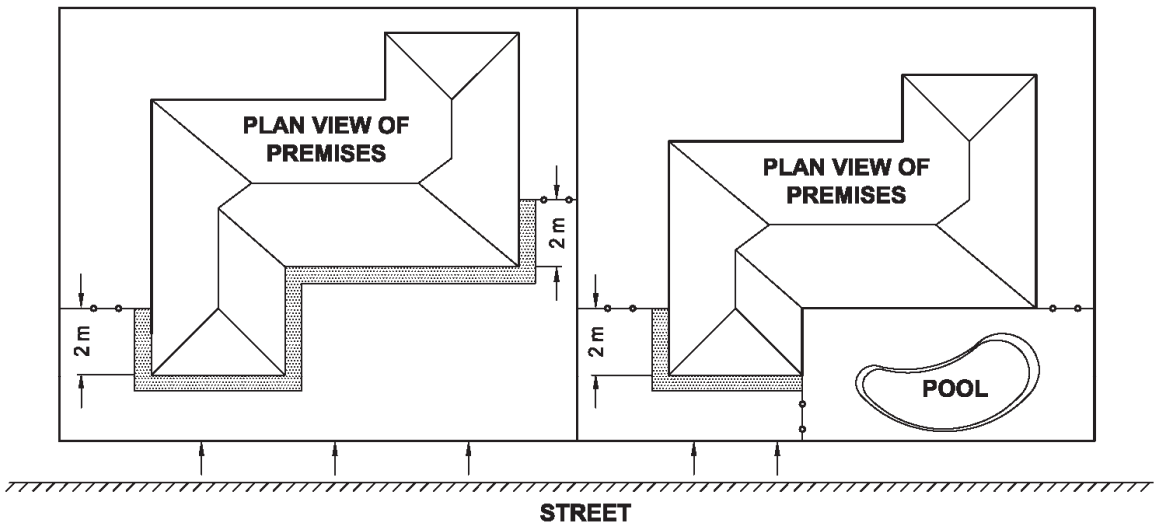
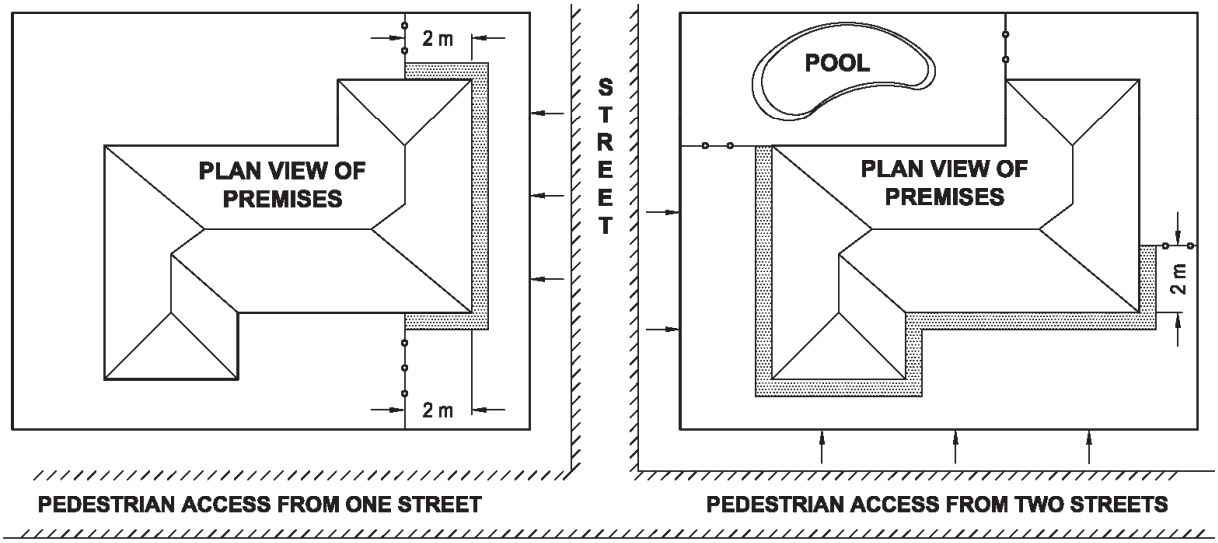
SINGLE STREET FRONTAGE



DOUBLE STREET FRONTAGE



SHADING SHOWS SUITABLE LOCATION FOR METER BOX. (NOT BEYOUND PROPERTY FENCE).

SHOWS PEDESTRIAN ACCESS.

PROPERTY FENCE.

NOTES:

1. Meters shall be erected on the side of the premises facing a street from which there is pedestrian access or within the first 2 metres along an adjacent side of the premises. (Unless otherwise approved in writing by the Meter Provider).

2. Point of attachment for the service and point of supply MUST NOT be positioned such that the Distributor's personnel need to climb on roofs or enter swimming pool areas.

Revision: A	SUITABLE LOCATION OF METER ENCLOSURE SINGLE DOMESTIC	ECMM - 7.9

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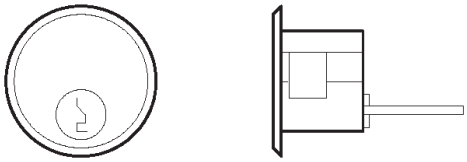
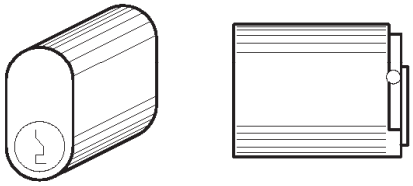
RIM LOCK CYLINDER



TYPE **201 CYL** FOR USE IN
NIGHTLATCH/STREAMLATCH/DEADLATCH TYPE LOCKSETS.

(CYLINDER ONLY PROVIDED.)

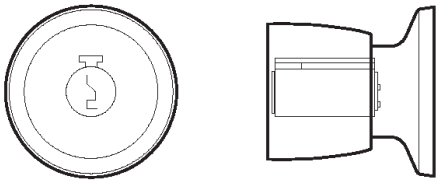
MORTICE LOCK CYLINDER



TYPE **570 CYL** FOR USE IN
CYLINDER MORTICE LOCKS AND LATCHES.

(CYLINDER ONLY PROVIDED.)

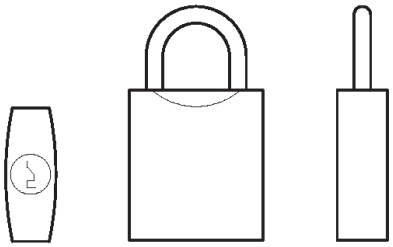
KEY - IN - KNOB CYLINDER



TYPE 530 CYL FOR USE IN KEY-IN-KNOB AND
KEY-IN-LEVER LOCKSETS.

(CYLINDER ONLY PROVIDED.)

BRASS PADLOCK

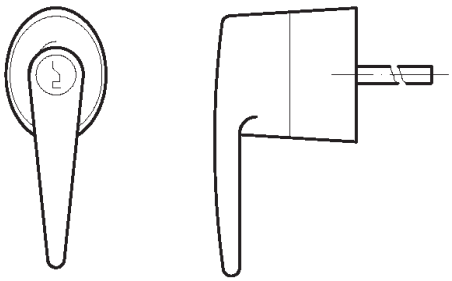


TYPE **234** FOR USE IN ERGON ENERGY
TYPE **234/SS** FOR USE IN ENERGEX

234/45/119 - 19mm SHACKLE
234/45/138 - 38mm SHACKLE
234/45/148 - 48mm SHACKLE
234/45/190 - 90mm SHACKLE

(COMPLETE LOCK PROVIDED.)

METER CUBICLE LOCK



TYPE **'L' HANDLE** OR **'T' HANDLE**
TO BE USED AS A METER CUBICLE LOCK.

(COMPLETE LOCK PROVIDED.)

NOTES:
1. USE 'EX' PREFIX TO INDICATE ENERGEX METERING KEY SYSTEM
   EG ENERGEX RIM LOCK CYLINDER USE TYPE EX201 CYL.

2. A LIST OF APPROVED LOCKSMITHS IS AVAILABLE ON THE
   DISTRIBUTORS WEBSITE - SEE CONTACTS PAGE FOR DETAILS.

Revision: A	MASTER KEYED METERING LOCK DETAILS	ECMM - 7.10

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8. *CONTROLLED SUPPLIES* - METHOD OF CONTROL

8.1. General

Unless an agreement has been negotiated with the *metering provider*, the *electrical contractor* shall install all meter, *AF receiver* and/or time switch wiring.

In general, separate time switches will not be used for any new metering installations. (Refer to Clause 6.3).

Pool filtration and associated sanitation systems in domestic installations may be connected to *Controlled Supply* via a socket outlet.

Where a socket outlet is provided for this purpose, it shall be permanently labelled that it is "Controlled Supply"

8.2. *AF Receivers*

8.2.1 Where equipment additional to water heating, is to be connected to a *controlled supply*, this equipment is to be permanently connected via a dedicated circuit and connected to a multi-switch *AF receiver* or multi switch electronic integrated meter.

Exception: Pool filtration and associated sanitation equipment may be connected to *Controlled Supply* via a socket outlet as per Clause 8.1

Note: On existing installations where submains are installed from the main switchboard/metering point to a distribution switchboard other equipment can be connected to the *controlled supply*, however, it will be switched at the same time as the hot water supply.

8.2.2 Single phase installations with a multi-switch *AF receiver* shall be connected in accordance with Drawings ECMM 8.1; 8.2; 8.6 and 8.8, or with an integrated meter in accordance with Drawings ECMM 8.3; 8.4 and 8.13.

8.2.3 Multiple installations where multi-switch *AF receivers* are utilised must be provided with an *AF receiver* switch per customer in accordance with Drawing ECMM 8.7 (*ENERGEX*) or 8.14 (*Ergon Energy*). Switching of individual *customer's* hot water by the use of contactors is not permitted.

Notes:

1. Connections to multi-switch *AF receivers* shall be clearly labelled to identify the switch applicable to each *customer*.
2. A separate metering isolation link is to be used for supply to the *AF receiver(s).* Where more than one switch per *customer* is required then an individual receiver per *customer* shall be used as per Clause 8.2.2.

8.2.4 Three phase installations with direct connected meters shall be connected in accordance with Drawing ECMM 8.5.

Note: Three phase loads (e.g. motors) shall be controlled via an *AF receiver* switching a contactor. (Refer Drawing ECMM 8.9).

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8.3. Contactor for Control of Non-Continuous Load

8.3.1 Where the single phase load to be controlled exceeds 30A resistive, 20A inductive (e.g. motors) or a combination of resistive and inductive load, a contactor, capable of being sealed, is required to be installed on the main switchboard or meter panel. (Refer to Clause 6.5 and Drawings ECMM 8.8; 8.11 and 8.12).

> In Energex's distribution area an additional switch of a multi switch *AF receiver* or multi element *integrated meter* may be used in place of a contactor in domestic installations provided the load on each switch complies with that given above. Paralleling of switches is not permitted.

Contactors with no external moving parts are suitable for use without further protection and do not require provision for sealing.

Three phase installations requiring a contactor shall have the *AF receiver* connected in accordance with Drawing ECMM 8.9 for *direct connected meters* and Drawing ECMM 8.10 for *current transformer metering*.

8.3.2 The contactor shall not be used for automatic load control (e.g. it shall not have a humidistat, a flow switch, a thermostat, a pressure switch or the like connected in its control circuit).

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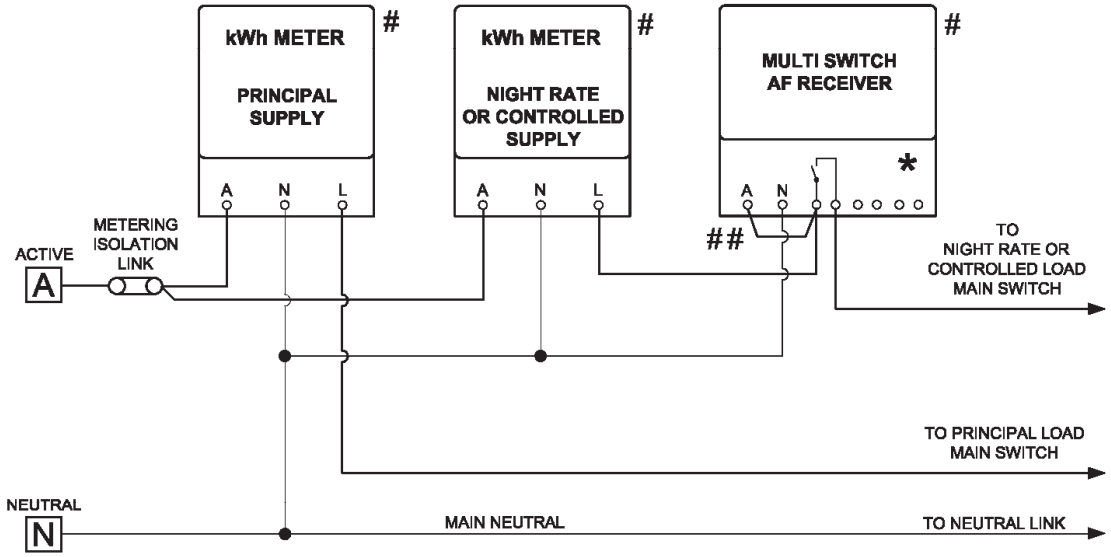

ITEMS SUPPLIED BY METERING PROVIDER.

* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.

● SOLDERED CONNECTION.

NOTES:

1. AF RECEIVER/TIME SWITCH CONNECTIONS ARE TO BE VERIFIED IN TERMINAL COVER BEFORE WIRING. DIFFERENT TYPES HAVE DIFFERENT/OPPOSITE CONNECTIONS.
2. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 and 7.17.
3. THE METERS, METERING ISOLATION LINK, AF RECEIVER OR TIME SWITCH TO BE SEALED BY METERING PROVIDER.
4. ## BRIDGE NOT REQUIRED FOR TIME SWITCH.
5. A METERING ISOLATION CIRCUIT BREAKER MAY BE USED IN LIEU OF A METERING ISOLATION LINK. (REFER TO CLAUSE 7.2.1).

Revision: A	AF RECEIVER MULTI SWITCH CONTROL DIRECT CONNECTED 1 PHASE METERING FOR PRINCIPAL SUPPLY & CONTROLLED SUPPLIES	ECMM - 8.1

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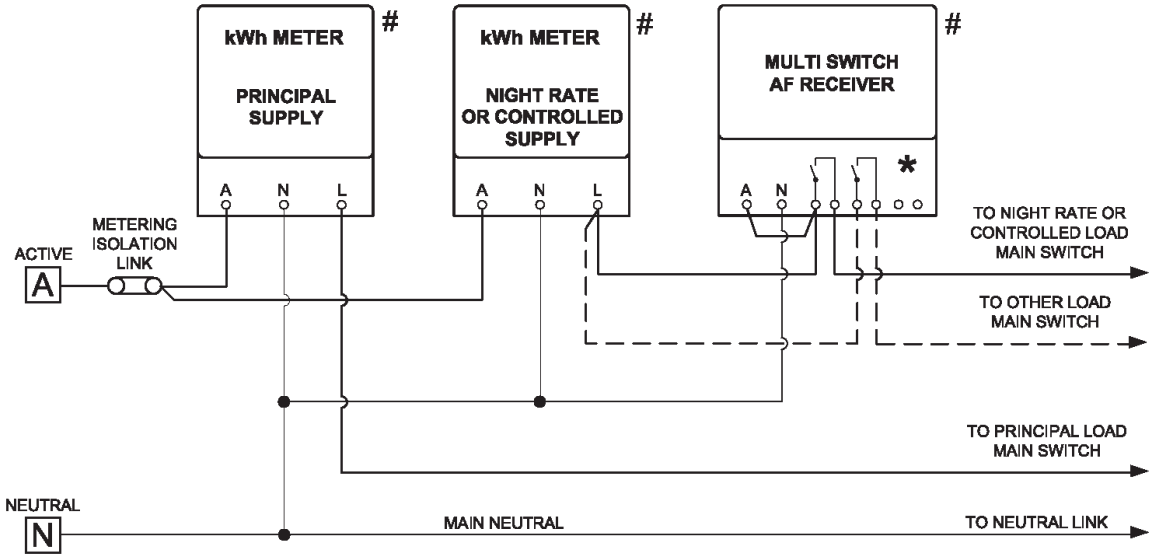
INCLUDES LOAD, OTHER THAN WATER HEATING LOAD, WHERE THE RESISTIVE LOAD DOES NOT EXCEED 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD DOES NOT EXCEED 20A



ITEMS SUPPLIED BY METERING PROVIDER.

* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.

● SOLDERED CONNECTION.

NOTES:

1. ALL METER WIRING SHALL CONFORM WITH CLAUSES 7.14 AND 7.17.
2. METERS, METERING ISOLATION LINK AND AF RECEIVER TO BE SEALED BY THE METERING PROVIDER.
3. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED. SEE DRAWING ECMM 8.8.
4. APPLIANCES CONNECTED TO THE CONTROLLED LOAD CIRCUITS MUST BE PERMANENTLY CONNECTED, AND FOR APPLIANCES SUCH AS DISHWASHERS THE INSTALLATION OF AN ISOLATING SWITCH WITH NEON INDICATOR IS RECOMMENDED.
5. A METERING ISOLATION CIRCUIT BREAKER MAY BE USED IN LIEU OF A METERING ISOLATION LINK. (REFER TO CLAUSE 7.2.1).
6. DOTTED LINES INDICATE VARIOUS SUPPLY OPTIONS.
7. IF CONTROLLED APPLIANCES ARE CONNECTED ON TWO CIRCUITS EACH BEING LESS THAN AF RECEIVER SWITCHING CAPACITY, A THREE SWITCH RECEIVER MAY BE USED.

Revision: A	AF RECEIVER MULTI SWITCH CONTROL DIRECT CONNECTED 1 PHASE METERING FOR PRINCIPAL SUPPLY & CONTROLLED SUPPLIES	ECMM - 8.2

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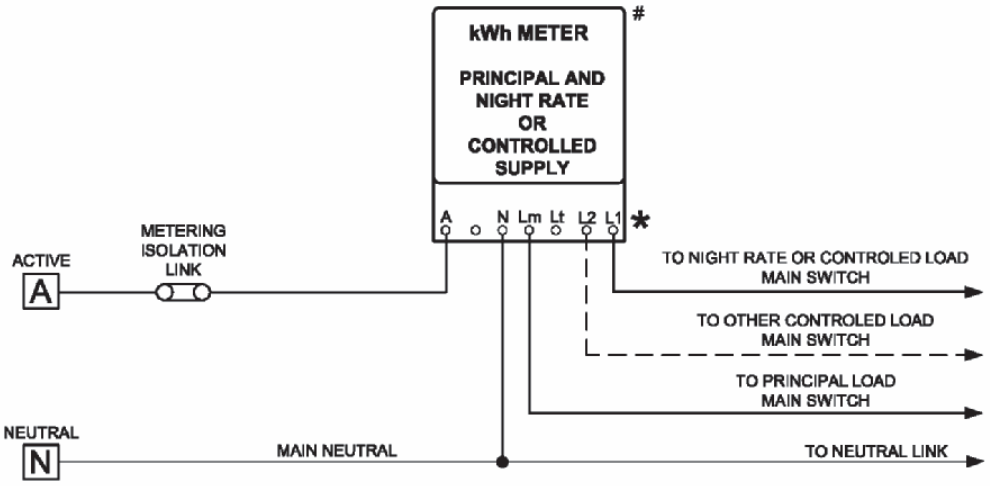
ENERGEX AND NON-RIPPLE CONTROL AREAS OF ERGON ENERGY ONLY



\# ITEMS SUPPLIED BY METERING PROVIDER.

* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.

● SOLDERED CONNECTION.

NOTES:

1. THIS ARRANGEMENT APPLIES TO NON-RIPPLE CONTROL AREAS OF ERGON ENERGY AND FOR LIMITED USE WITHIN ENERGEX WHERE SWITCHBOARD SPACE IS RESTRICTED. (REF. CLAUSE 6.3)
2. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
3. METER AND METERING ISOLATION LINK TO BE SEALED BY METERING PROVIDER.
4. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED. SEE DRAWING ECMM 8.11 .
5. CONTROLLED CIRCUIT ASSOCIATED WITH SECONDARY SUPPLIES CONNECTED TO SWITCHED TERMINALS L1/L2 OF TWO ELEMENT METER.
6. TWO ELEMENT METER TERMINAL DESCRIPTION.

1	A - ACTIVE IN
3	N - NEUTRAL IN
4	Lm - ELEMENT 1 (MAIN)
5	Lt - ELEMENT 2 (UNSWITCHED)
6,7	L1 & L2 ELEMENT 2 (SWITCHED)

7. A METERING ISOLATION CIRCUIT BREAKER MAY BE USED IN LIEU OF A METERING ISOLATION LINK. (REFER TO CLAUSE 7.2.1).

Revision:		
B	SINGLE PHASE 2-ELEMENT INTEGRATED METER DIRECT CONNECTED METERING PRINCIPAL & CONTROLLED SUPPLIES (TYPICAL WIRING DIAGRAM)	ECMM - 8.3

Joint document between ENERGEX and Ergon Energy
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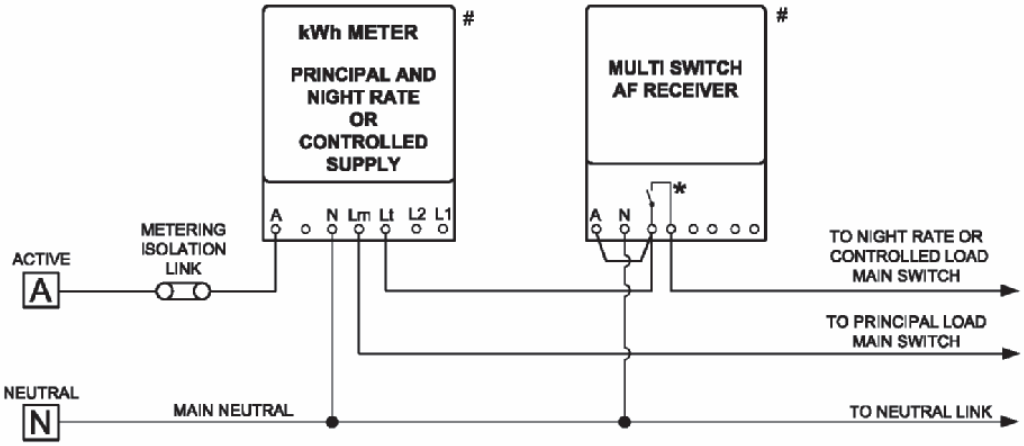
ERGON ENERGY RIPPLE CONTROL AREAS ONLY (REFER TO CLAUSE 6.3)



\# ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY TARIFF AND LOAD TYPE.
● SOLDERED CONNECTION

NOTES:

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. METER, METERING ISOLATION LINK AND AF RECEIVER TO BE SEALED BY METERING PROVIDER.
3. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED. SEE DRAWING ECMM 8.12.
4. ELEMENT 1 FOR PRINCIPAL SUPPLY ONLY, ELEMENT 2 FOR EITHER CONTROLLED OR NIGHT RATE SUPPLIES.
5. IN RIPPLE AREAS, SECONDARY TARIFF SWITCHING IS DONE BY AF RECEIVER.
6. CONTROLLED CIRCUIT ASSOCIATED WITH SECONDARY SUPPLY CONNECTED TO UNSWITCHED TERMINAL Lt.
7. TWO ELEMENT METER TERMINAL DESCRIPTION.

1	A - ACTIVE IN
3	N - NEUTRAL IN
4	Lm - ELEMENT 1 (MAIN)
5	Lt - ELEMENT 2 (UNSWITCHED)
6, 7	L1 & L2 - NOT USED IN RIPPLE AREAS

8. A METERING ISOLATION CIRCUIT BREAKER MAY BE USED IN LIEU OF A METERING ISOLATION LINK. (REFER TO CLAUSE 7.2.1).

Revision:		
B	SINGLE PHASE 2-ELEMENT DIRECT CONNECTED METERING PRINCIPAL & CONTROLLED SUPPLIES IN RIPPLE AREAS (TYPICAL WIRING DIAGRAM)	ECMM - 8.4

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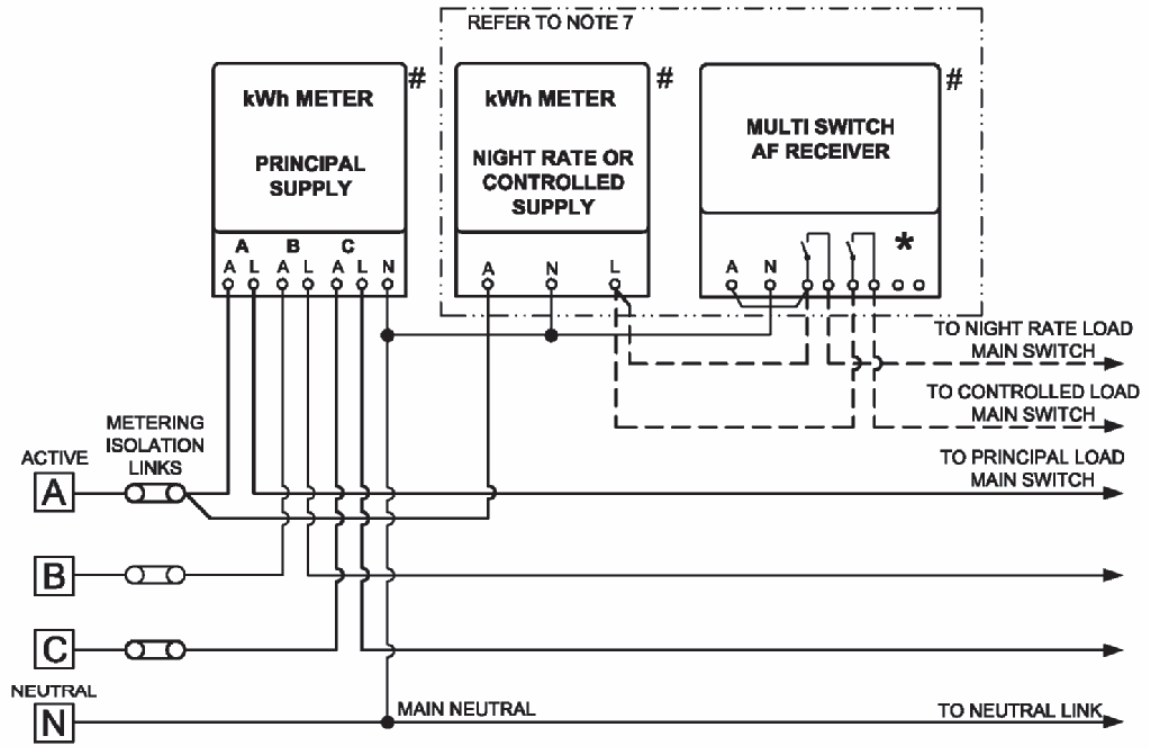

ITEMS SUPPLIED BY METERING PROVIDER.

* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.

● SOLDERED CONNECTION.

NOTES:

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. FOR CONTROLLED SUPPLIES, WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED. (SEE DRAWING ECMM 8.9).
3. METERS, METERING ISOLATION LINKS AND AF RECEIVER TO BE SEALED BY METERING PROVIDER.
4. DOTTED LINES INDICATE VARIOUS SUPPLY OPTIONS.
5. A METERING ISOLATION CIRCUIT BREAKER MAY BE USED IN LIEU OF THE METERING ISOLATION LINK REFER TO CLAUSE 7.2.1.
6. IN ERGON ENERGY NON-RIPPLE CONTROL AREAS, THE SINGLE ELEMENT kWh METER / AF RECEIVER COMBINATION TO BE REPLACED WITH A 2 ELEMENT METER. SEE DRAWING ECMM 8.3.

Revision: B	AF RECEIVER WITH DIRECT CONNECTED 3 PHASE PRINCIPAL SUPPLY METER & 1 PHASE METER FOR NIGHT RATE OR CONTROLLED SUPPLIES	ECMM - 8.5

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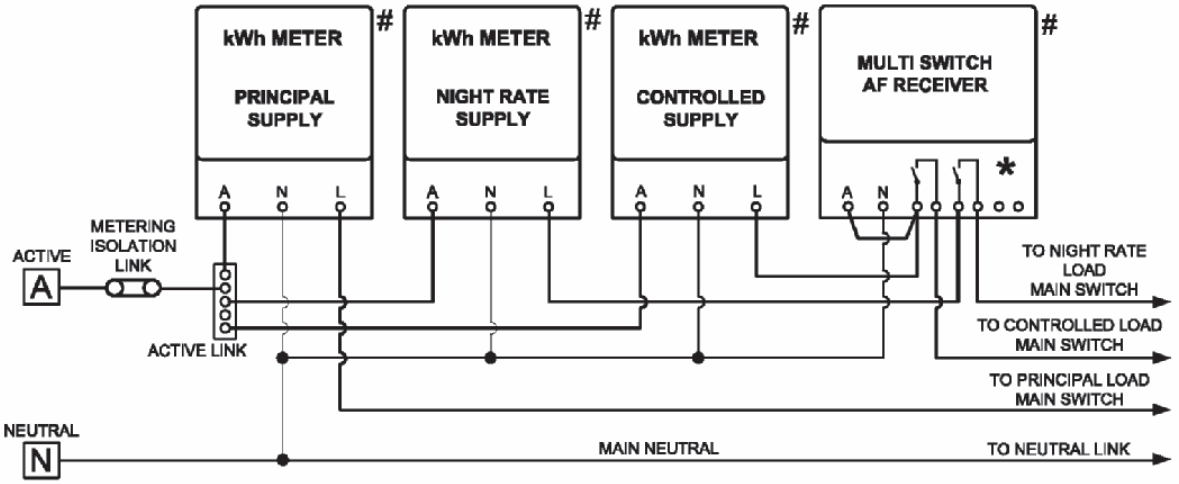
INCLUDES LOAD OTHER THAN WATER HEATING LOAD WHERE
RESISTIVE LOAD DOES NOT EXCEED 30A OR
RESISTIVE AND INDUCTIVE LOAD DOES NOT EXCEED 20A



ITEMS SUPPLIED BY METERING PROVIDER.

* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.

● SOLDERED CONNECTION.

NOTES:

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. A METERING ISOLATION CIRCUIT BREAKER MAY BE USED IN LIEU OF THE METERING ISOLATION LINK REFER TO CLAUSE 7.2.1.
3. METERS, METERING ISOLATION LINK, ACTIVE LINK AND AF RECEIVER TO BE SEALED . BY THE METERING PROVIDER.
4. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED. (SEE DRAWING ECMM 8.8).

Revision:		
B	AF RECEIVER MULTI SWITCH CONTROL DIRECT CONNECTED 1 PHASE METERING FOR PRINCIPAL SUPPLY, NIGHT RATE AND CONTROLLED SUPPLIES	ECMM - 8.6

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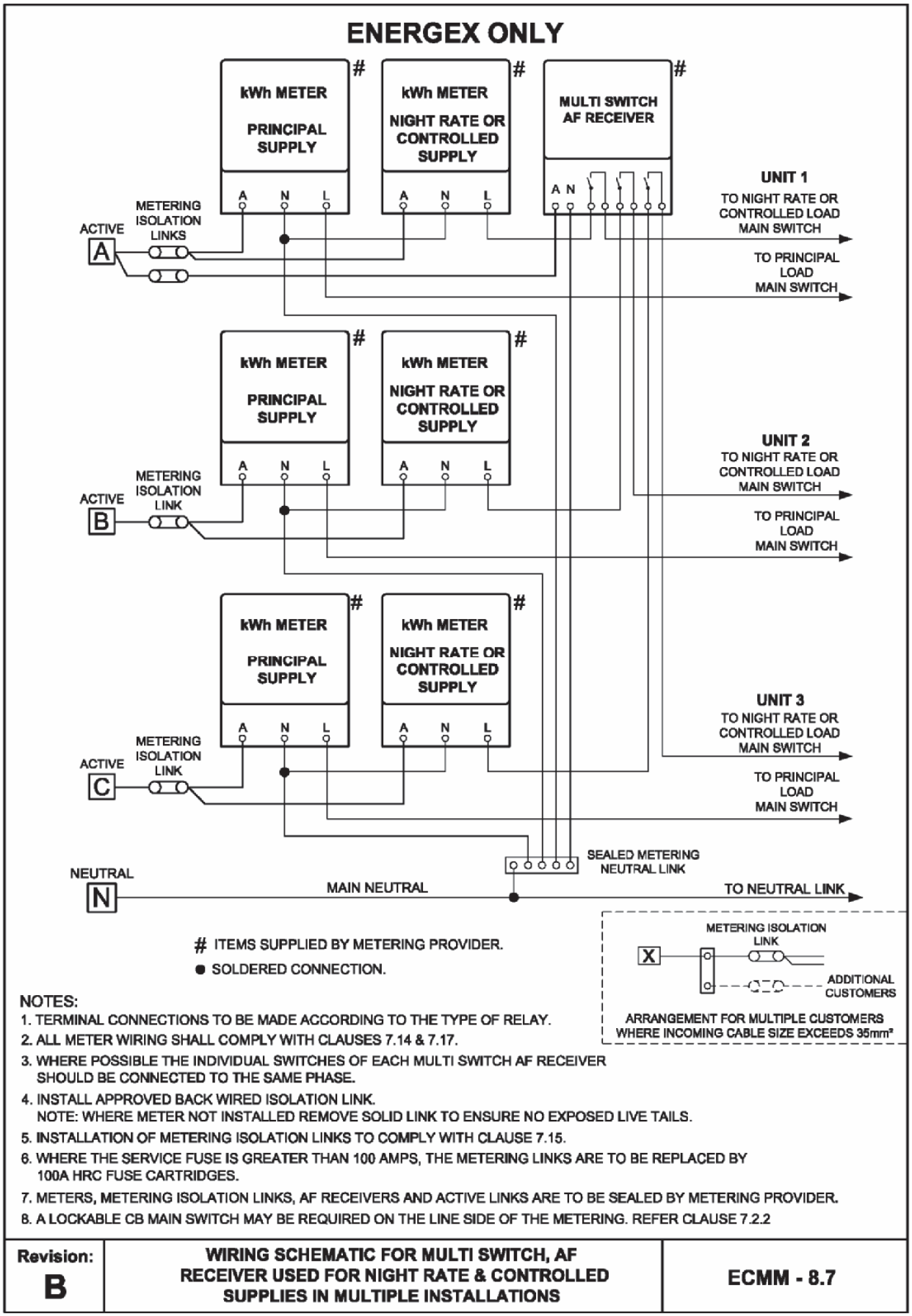

NOTES:

1. TERMINAL CONNECTIONS TO BE MADE ACCORDING TO THE TYPE OF RELAY.
2. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 & 7.17.
3. WHERE POSSIBLE THE INDIVIDUAL SWITCHES OF EACH MULTI SWITCH AF RECEIVER SHOULD BE CONNECTED TO THE SAME PHASE.
4. INSTALL APPROVED BACK WIRED ISOLATION LINK.
   NOTE: WHERE METER NOT INSTALLED REMOVE SOLID LINK TO ENSURE NO EXPOSED LIVE TAILS.
5. INSTALLATION OF METERING ISOLATION LINKS TO COMPLY WITH CLAUSE 7.15.
6. WHERE THE SERVICE FUSE IS GREATER THAN 100 AMPS, THE METERING LINKS ARE TO BE REPLACED BY 100A HRC FUSE CARTRIDGES.
7. METERS, METERING ISOLATION LINKS, AF RECEIVERS AND ACTIVE LINKS ARE TO BE SEALED BY METERING PROVIDER.
8. A LOCKABLE CB MAIN SWITCH MAY BE REQUIRED ON THE LINE SIDE OF THE METERING. REFER CLAUSE 7.2.2

Revision: B	WIRING SCHEMATIC FOR MULTI SWITCH, AF RECEIVER USED FOR NIGHT RATE & CONTROLLED SUPPLIES IN MULTIPLE INSTALLATIONS	ECMM - 8.7

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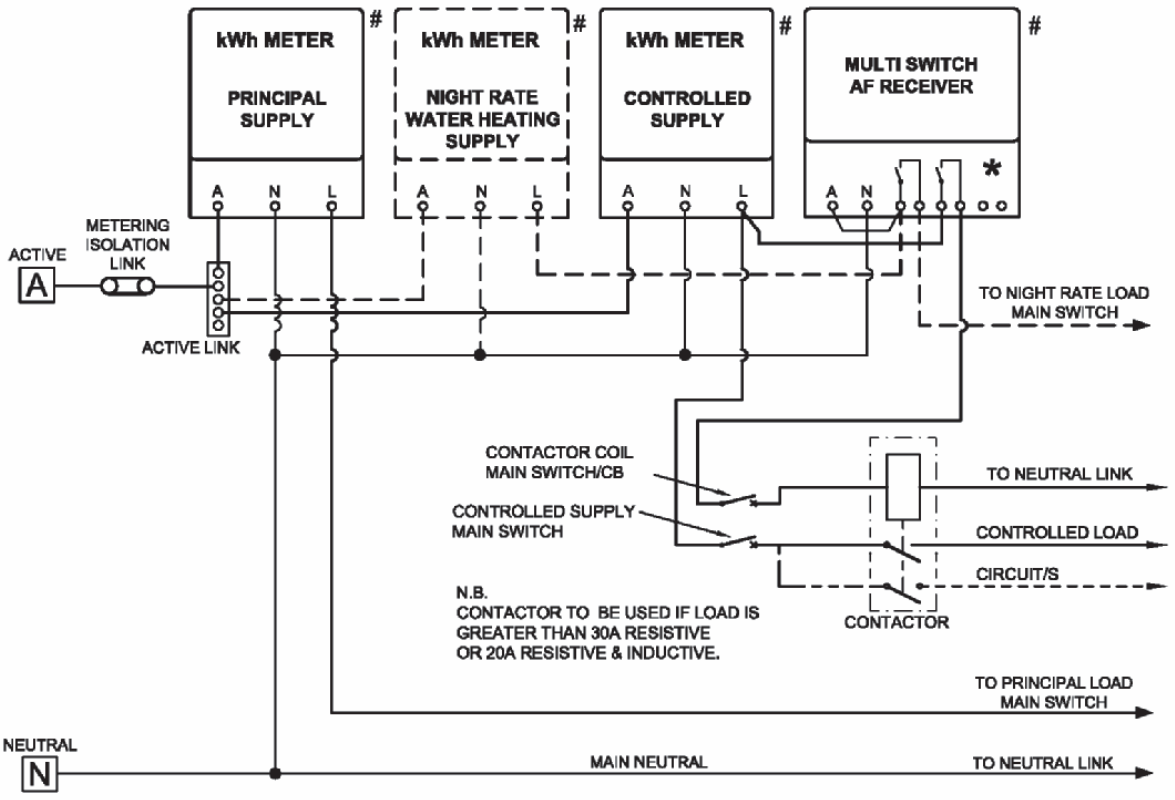
AF RECEIVER MULTI SWITCH CONTROL
DIRECT CONNECTED 1 PHASE METERING FOR PRINCIPAL SUPPLY WITH OPTIONAL NIGHT RATE HEATING AND OTHER CONTROLLED LOAD SWITCHED VIA CONTACTOR



ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:
1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. A METERING ISOLATION CIRCUIT BREAKER MAY BE USED IN LIEU OF THE METERING ISOLATION LINK REFER TO CLAUSE 7.2.1.
3. CUSTOMER TO SUPPLY CONTACTOR AND ALL ITEMS NOT MARKED WITH AN " #".
4. METERS, METERING ISOLATION LINK, ACTIVE LINK, AF RECEIVER & CONTACTOR TO BE SEALED BY THE METERING PROVIDER.
5. DOTTED LINES INDICATE VARIOUS SUPPLY OPTIONS.

Revision: B	AF RECEIVER MULTI SWITCH CONTROL SWITCHED VIA CONTACTOR "SEE ABOVE FOR FULL TITLE"	ECMM - 8.8

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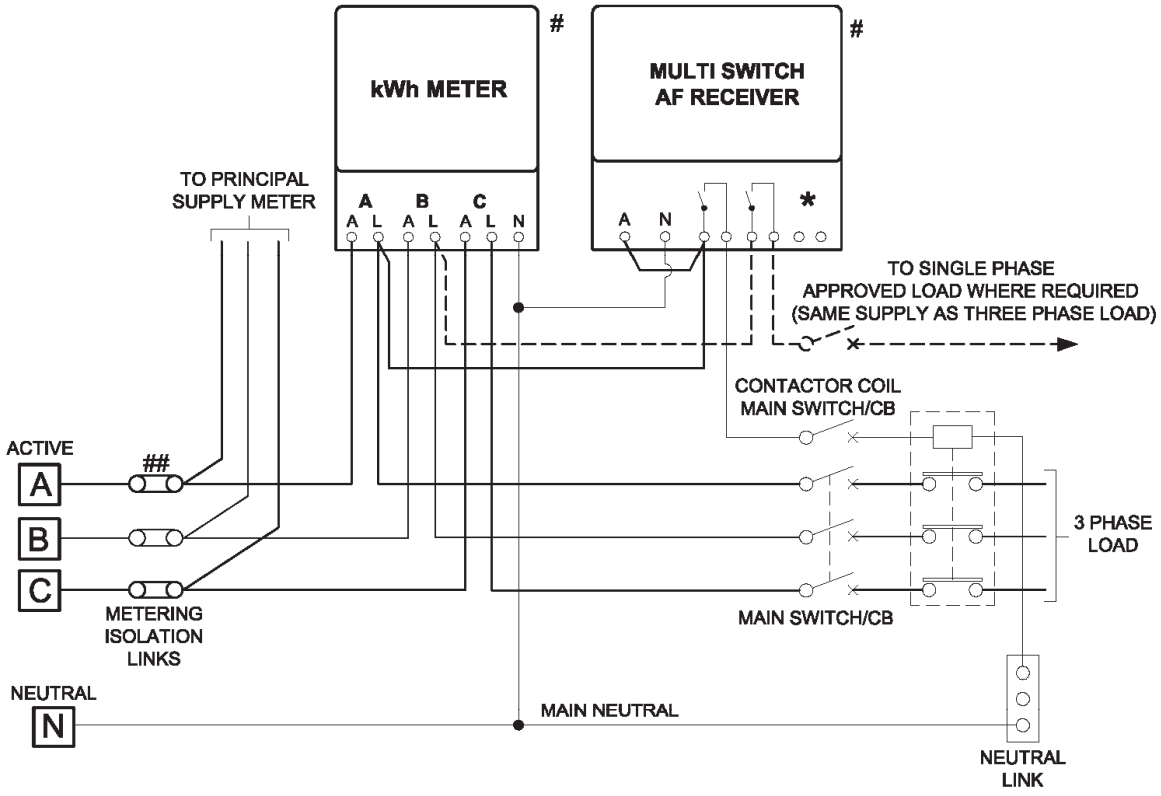

ITEMS SUPPLIED BY METERING PROVIDER.

* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.

● SOLDERED CONNECTION.

NOTES:

1. A.F. TWO SWITCH RECEIVER WITH SEPARATE SUPPLY AND SWITCH CIRCUITS IS TO BE USED TO CONTROL CONTACTOR.
2. CUSTOMER TO SUPPLY CONTACTOR, METERING NEUTRAL LINKS, ALL WIRING AND ALL ITEMS NOT MARKED WITH AN "#".
3. METERS, METERING ISOLATION LINKS, AF RECEIVER, CONTACTOR, METERING ACTIVE AND NEUTRAL LINK & AF RECEIVER SUPPLY FUSE TO BE SEALED BY METERING PROVIDER.
4. INSTALL APPROVED BACK WIRED ISOLATION LINKS.
   NOTE: WHERE METER NOT INSTALLED REMOVE SOLID LINKS TO ENSURE NO EXPOSED LIVE TAILS

5. CURRENT LIMITING DEVICES FOR THE PROTECTION OF WHOLE CURRENT METERING CIRCUITS SHALL BE NO GREATER THAN A 100A HRC FUSE OR EQUIVALENT.

6. IF THE PRINCIPAL SUPPLY AND CONTROLLED SUPPLY LOAD EXCEED THE METER ISOLATION LINK RATING, A SEPARATE SET OF METERING ISOLATION LINKS FOR EACH METER SHALL BE PROVIDED.

Revision: A	TYPICAL DIAGRAM-DIRECT CONNECTED METERING 3 PHASE NIGHT RATE OR CONTROLLED SUPPLIES SWITCHED VIA CONTACTOR	ECMM - 8.9

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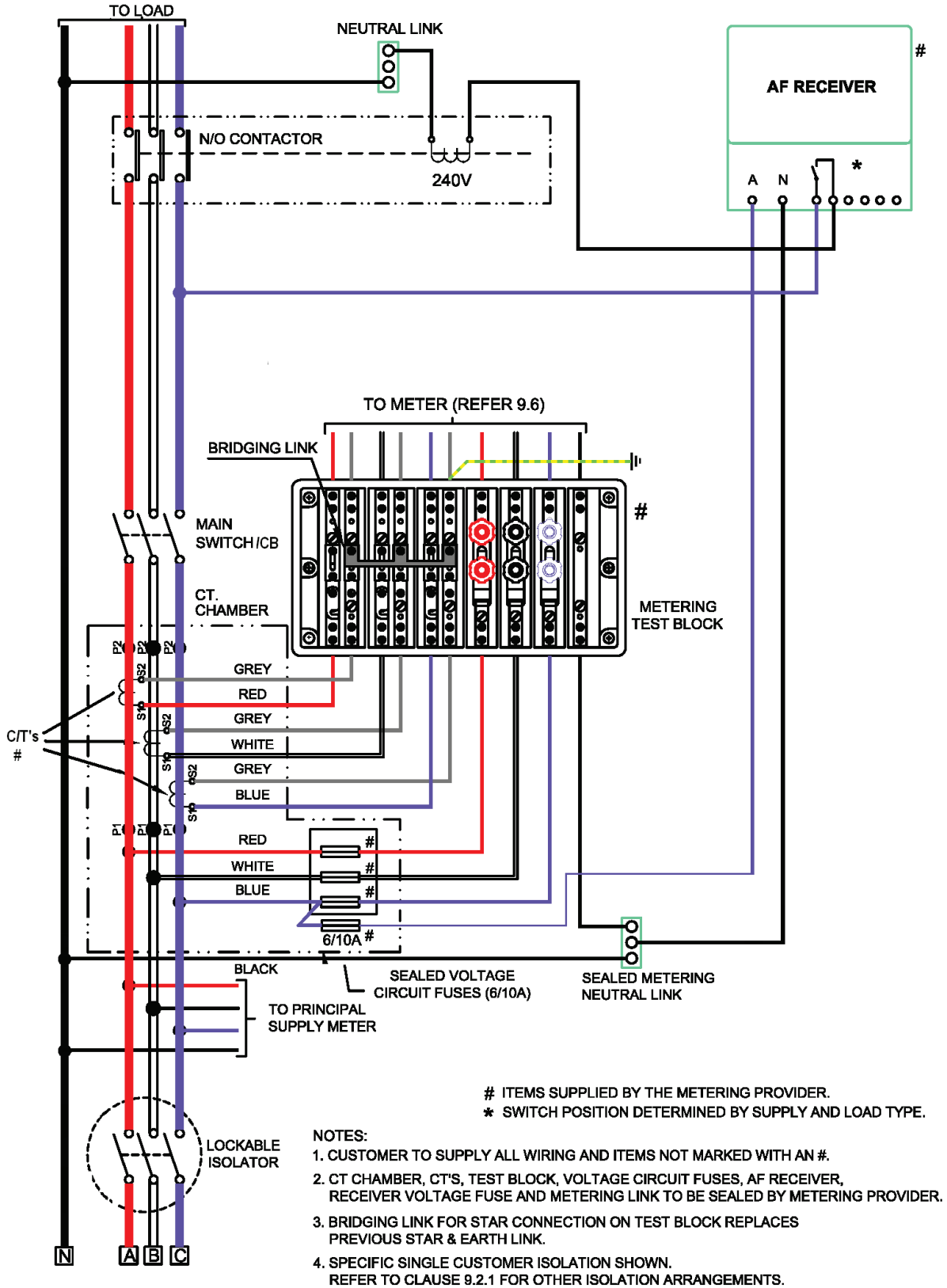

Revision: B	CT. OPERATED METERING 3 PHASE NIGHT RATE OR CONTROLLED SUPPLIES SWITCHED VIA CONTACTOR	ECMM - 8.10

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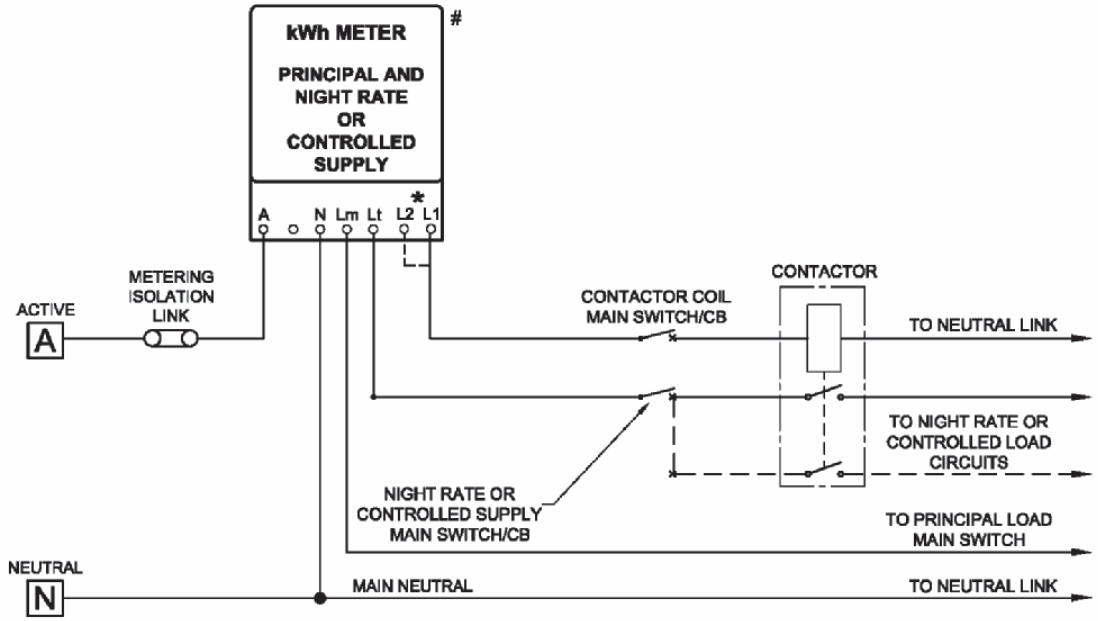
ENERGEX AND NON-RIPPLE CONTROL AREAS OF ERGON ENERGY ONLY



\# ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:

1. THIS ARRANGEMENT APPLIES TO NON-RIPPLE CONTROL AREAS OF ERGON ENERGY AND FOR LIMITED USE WITHIN ENERGEX WHERE SWITCHBOARD SPACE IS RESTRICTED (REF. CLAUSE 6.3)
2. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
3. METER, METERING ISOLATION LINK AND CONTACTOR TO BE SEALED BY METERING PROVIDER.
4. CUSTOMER TO SUPPLY CONTACTOR ALL WIRING AND ALL ITEMS NOT MARKED WITH "#".
5. CONTACTOR CONTROL CIRCUIT ASSOCIATED WITH SECONDARY SUPLIES CONNECTED TO SWITCHED TERMINAL L1 OR TERMINAL L2.
6. SECONDARY SUPPLY LOADS CONNECTED VIA CONTACTOR TO UNSWITCHED METER TERMINAL Lt.
7. ELEMENT 1 FOR PRINCIPAL SUPPLY ONLY, ELEMENT 2 FOR EITHER NIGHT RATE OR CONTROLLED LOAD.
8. TWO ELEMENT METER TERMINAL DESCRIPTION.

1	A - ACTIVE IN
3	N - NEUTRAL IN
4	Lm - ELEMENT 1 (MAIN)
5	Lt - ELEMENT 2 (UNSWITCHED)
6/7	L1 & L2 ELEMENT 2 (SWITCHED)

Revision:		
B	SINGLE PHASE 2-ELEMENT INTEGRATED METER DIRECT CONNECTED METERING PRINCIPAL & SECONDARY SUPPLIES SWITCHED VIA CONTACTOR (TYPICAL WIRING DIAGRAM)	ECMM - 8.11

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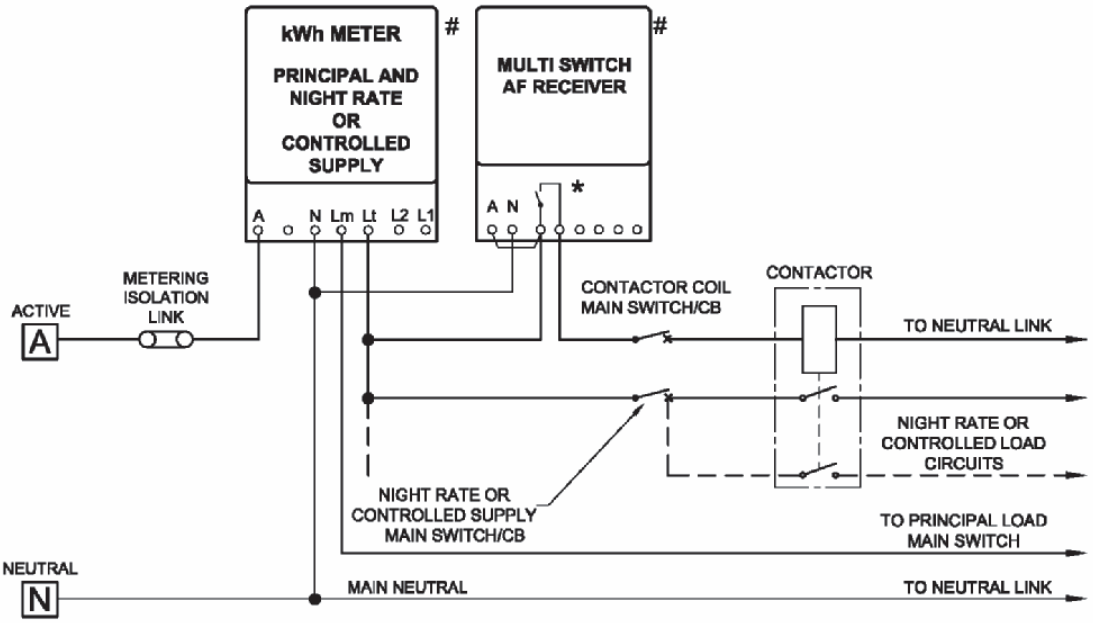
RIPPLE CONTROL AREAS OF ERGON ENERGY ONLY



ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. METER, METERING ISOLATION LINK, AF RECEIVER AND CONTACTOR TO BE SEALED BY METERING PROVIDER.
3. CUSTOMER TO SUPPLY CONTACTOR ALL WIRING AND ALL ITEMS NOT MARKED WITH "#".
4. SECONDARY SUPPLY LOADS CONNECTED TO UNSWITCHED METER TERMINAL Lt.
5. ELEMENT 1 FOR PRINCIPAL LOAD ONLY, ELEMENT 2 FOR EITHER NIGHT RATE OR CONTROLLED LOAD.
6. IN RIPPLE AREAS, SECONDARY SUPPLY CONTACTOR CONTROLLED VIA AF RECEIVER.
7. TWO ELEMENT METER TERMINAL DESCRIPTION.

1	A - ACTIVE IN
3	N - NEUTRAL IN
4	Lm - ELEMENT 1 (MAIN)
5	Lt - ELEMENT 2 (UNSWITCHED)
6, 7	L1 & L2 NOT USED IN RIPPLE AREAS

Revision:		
B	SINGLE PHASE 2-ELEMENT INTEGRATED METER PLUS AF RECEIVER DIRECT CONNECTED METERING PRINCIPAL & SECONDARY SUPPLIES SWITCHED VIA CONTACTOR (TYPICAL WIRING DIAGRAM)	ECMM - 8.12

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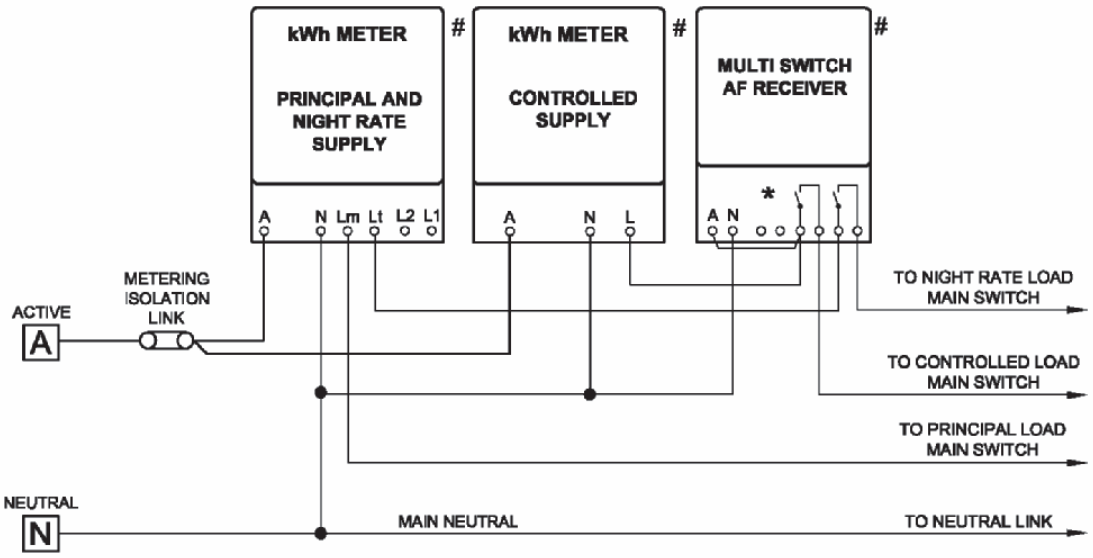
RIPPLE CONTROL AREAS OF ERGON ENERGY ONLY



\# ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. METER, METERING ISOLATION LINK AND AF RECEIVER TO BE SEALED BY METERING PROVIDER.
3. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED. (SEE DRAWING ECMM 8.12).
4. IN RIPPLE AREAS, SECONDARY SUPPLY SWITCHING IS DONE BY AF RECEIVERS.
5. CONTROLLED CIRCUIT ASSOCIATED WITH NIGHT RATE SUPPLY CONNECTED TO UNSWITCHED TERMINAL Lt OF TWO ELEMENT METER.
6. TWO ELEMENT METER TERMINAL DESCRIPTION.

1	A - ACTIVE IN
3	N - NEUTRAL IN
4	Lm - ELEMENT 1 (MAIN)
5	Lt - ELEMENT 2 (UNSWITCHED)
6, 7	L1 & L2 NOT USED IN RIPPLE AREAS

Revision:		
B	SINGLE PHASE 2-ELEMENT INTEGRATED METER PLUS AF RECEIVER DIRECT CONNECTED METERING PRINCIPAL & SECONDARY SUPPLIES (TYPICAL WIRING DIAGRAM)	ECMM - 8.13

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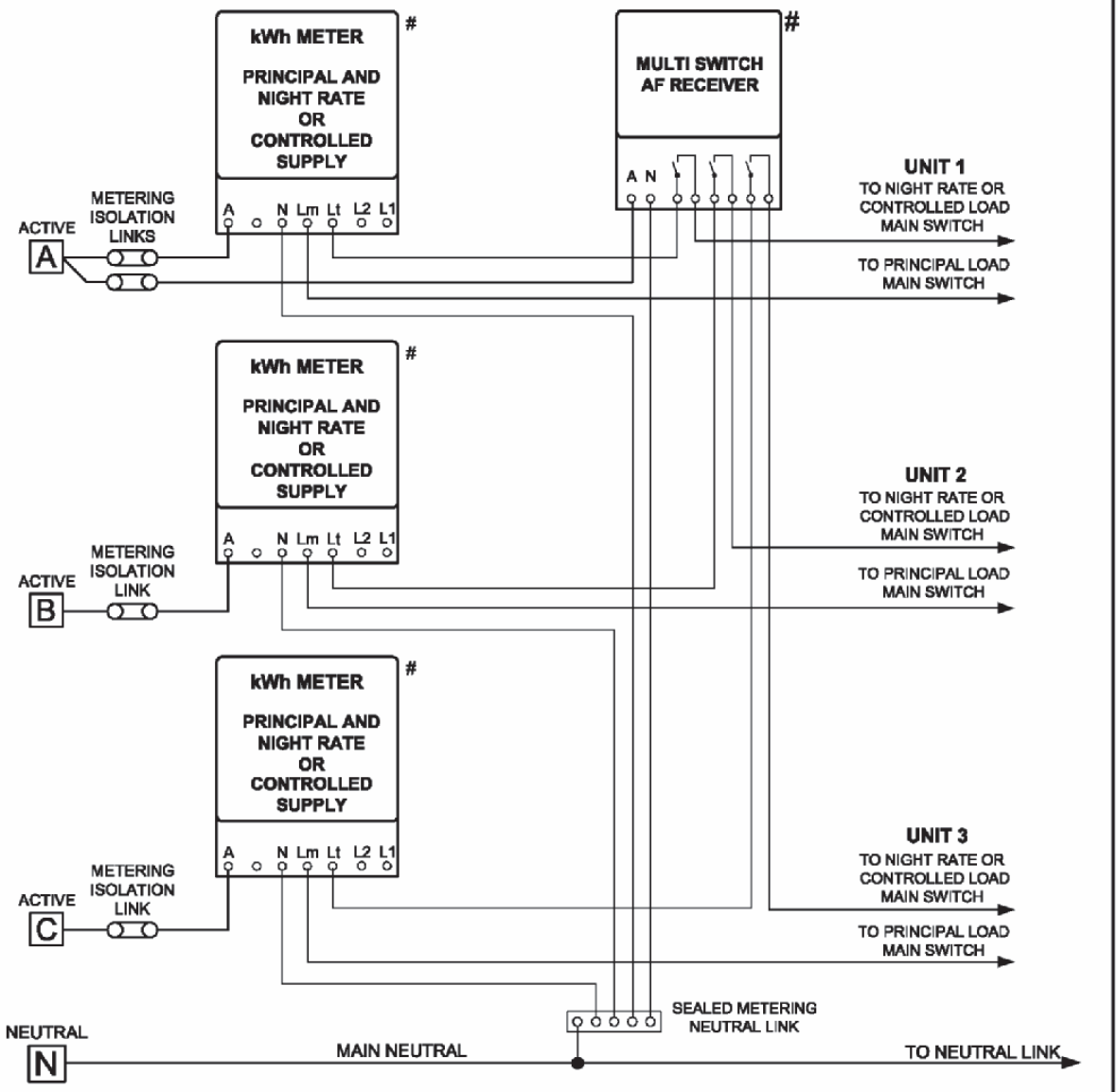
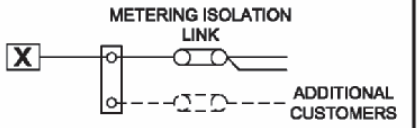
RIPPLE CONTROL AREAS OF ERGON ENERGY ONLY



ITEMS SUPPLIED BY METERING PROVIDER.

● SOLDERED CONNECTION.



ARRANGEMENT FOR MULTIPLE CUSTOMERS WHERE INCOMING CABLE SIZE EXCEEDS 35mm²

NOTES:

1. TERMINAL CONNECTIONS TO BE MADE ACCORDING TO THE TYPE OF RELAY.
2. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 & 7.17.
3. WHERE POSSIBLE THE INDIVIDUAL SWITCHES OF EACH MULTI SWITCH AF RECEIVER SHOULD BE CONNECTED TO THE SAME PHASE.
4. INSTALL APPROVED BACK WIRED ISOLATION LINK.
   NOTE: WHERE METER NOT INSTALLED REMOVE SOLID LINK TO ENSURE NO EXPOSED LIVE TAILS.
5. INSTALLATION OF METERING ISOLATION LINKS TO COMPLY WITH CLAUSE 7.15.
6. WHERE THE SERVICE FUSE IS GREATER THAN 100 AMPS, THE METERING LINKS ARE TO BE REPLACED BY 100A HRC FUSE CARTRIDGES.
7. METERS, METERING ISOLATION LINKS AND AF RECEIVERS AND ACTIVE LINKS ARE TO BE SEALED BY METERING PROVIDER.
8. A LOCKABLE CB MAIN SWITCH MAY BE REQUIRED ON THE LINE SIDE OF THE METERING. REFER CLAUSE 7.2.2

Revision: B	WIRING SCHEMATIC FOR MULTI SWITCH, AF RECEIVER USED FOR NIGHT RATE & CONTROLLED SUPPLIES IN MULTIPLE INSTALLATIONS	ECMM - 8.14

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9. INSTALLATION REQUIREMENTS FOR LOW VOLTAGE *CURRENT TRANSFORMER METERING*

9.1. General

The following procedures are to be adopted when assessing the metering requirements, for new installations or additional load for an existing installation, and arranging for the installation of *current transformer metering*. (Refer to Clauses 2.1 and 6.1 for *metering provider* details).

9.2. Isolation of *Current Transformer Metering* Equipment

9.2.1 General

To facilitate the requirements of the *Electrical Safety Act 2002 and Electrical Safety Regulation 2002* for performing electrical work, supply to the revenue metering equipment for each *customer* is to be capable of being individually isolated by a suitable isolator or main switch. All isolation equipment shall be clearly identified and readily accessible and shall be installed and maintained by the *customer*.

Where *direct connected metering* is installed at the same switchboard as *current transformer metering*, the *direct connected metering* is to comply with Clause 7.2.

(a) Specific Single Customer *Current Transformer Metered* Installations

Specific single *customer current transformer metered* installations include installations where:

(i) Supply to the installation is interrupted for extended continuous periods of time (>2 days) e.g. irrigation pumps, flood lifters, grain silos etc. (i.e. where the main switch is used to control the installation and leave the electronic meter without supply so that it cannot be read); or

(ii) “Safety Services” are installed and require supply to be maintained.

Note: AS/NZS 3000 (Wiring Rules) permits lockable isolators for installations supplying “Safety Services”.

In these specific single *customer current transformer metered* installations the *customer* shall install a lockable load-break isolator (with facility for locking on and off) on the line side of the *current transformer metering* chamber with the main switch(s) installed on the load side. In these specific installations, the isolator may be locked in the on position. (Refer to Drawing ECMM 9.1-2).

Where the metering current transformers are installed remote from the main switchboard, the isolator shall be marked “Metering Isolator”.

(b) Other Single Customer *Current Transformer Metered* Installations

This includes all other single *customer current transformer metered* installations where supply to the electronic meter will not be interrupted for extended continuous periods of time.

The preferred arrangement is to connect all single *customer current transformer metered* installations as per (a) above, however, in the interests of reducing costs to the *customer*, a main switch used as the lockable isolator installed on the line side of the *current transformer metering* is permitted. The switch shall be capable of being locked in the off position. (Refer to Drawing ECMM 9.1-2).

(c) Multiple Customer *Current Transformer Metered* Installations

(i) Isolation of entire installation (Building Isolator).

Where the switchboard is supplied directly from the transformer terminals, with no LV isolation, a lockable load-break isolator (with facility for locking off) that is capable of isolating supply to the entire electrical installation is required.

Exception: Where the *distributor* has a suitable means of isolation on the LV supply, a lockable isolator that controls the entire installation is not mandatory, however for the safety of persons working on the main switchboard it is recommended.

Note: A charge will be made where the *distributor* is required to isolate supply.

(ii) Isolation of individual *customers*.

A lockable load-break isolator (with facility for locking off) shall be installed on the line side of each set of revenue metering current transformers with the customer's main switch(s) installed on the load side. (Refer to Drawings ECMM 9.1-1 and 9.1-2).

9.3. Current Transformers - When Required

The *customer* shall make provision for the installation of *current transformer metering* where the calculated maximum demand of the load to be metered exceeds 120A per phase as determined in accordance with the guidelines given in AS/NZS 3000 (Wiring Rules). *Current transformer metering* shall be used for actual loads greater than 90A or motors larger than 50kW (65hp).

Unless otherwise advised by the *metering provider*, *direct connected meters* rated up to 100A will be supplied for loads less than these values.

For new installations or installations with additional load, the *metering provider* will not supply one *customer* with multiple sets of *directly connected meters* on the same supply type (e.g. general supply) at the same *point of supply* in lieu of *current transformer metering*.

9.4. Equipment Supplied by the *Metering Provider*

The *metering provider* will supply the current transformers, E.S.A.A pattern test block, voltage circuit fuses with HRC cartridges and fuse sealing blocks with covers. *ENERGEX* provides current transformer ratio and neutral identification labels for use in their area.

Note: Where the *metering provider* is not the *distributor*, the *distributor* will supply the current transformers, test block etc. and the *retailer's metering provider* will provide the meter and/or communications equipment.

9.5. Current Transformer Selection

In general the standard current transformers supplied by the *distributor* or the *metering provider* are E.S.A.A type "S", "T" and "W".

TABLE 9.1 below details the type, ratio and accuracy range of current transformers supplied.

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TABLE 9.1

TYPE OF CT	CT RATIO	CLASS (AS 60044)	ACCURACY RANGE OF CT (AMPS)	EXPECTED MAX. LOAD (kVA)	EXPECTED MAX. LOAD (AMPS)
S (long range)	200/5	0.5S ext 200%	2 - 400	250	350
T (long range)	800/5	0.5S ext 200%	8 - 1600	1000	1400
W (long range)	1500/5	0.5S ext 250%	15 - 3750	2000	3000

Note: Long range current transformers of the "S", "T" and "W" types shall be used for loads up to maximum values of 350, 1400 and 3000A respectively.

9.6. Housing of Current Transformers and Meter Voltage Circuit Fuses

9.6.1 On new installations and where major alterations are to be carried out, each set of current transformers and meter voltage fuses are required to be mounted in a separate dedicated metering chamber. This chamber is to enclose only the metering provider's equipment. (Refer to Drawing ECMM 9.2).

In general, each current transformer chamber is a dedicated chamber for one NMI and as such, no other equipment or wiring is permitted in or to pass through the chamber, however, cables enclosed in a continuous metal duct located in a back corner of the current transformer chamber are permitted. (Refer to TABLE 9.3).

9.6.2 Current transformer chambers shall be labelled to indicate the presence of the revenue metering current transformers and access panels shall have provision for sealing. The electrical contractor or switchboard manufacturer shall supply and install labels stating "Revenue Metering Current Transformers" on current transformer chambers.

9.6.3 To allow commissioning and testing of current transformer metering installations to be performed safely, all live low voltage parts within current transformer chambers are to be insulated. Heat shrink insulation is acceptable for insulating busbars. All bolted busbar or cable connections are to be covered with non-adhesive insulation secured in place by cable ties.

9.6.4 Where a removable cover is used to enclose the dedicated metering current transformer chamber it shall be fitted with a minimum of two handles to allow safe removal without disconnecting supply. This requirement does not apply to hinged covers. Locks are not permitted as a means of securing current transformer chambers due to the difficulty in obtaining access.

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9.6.5 Entry and exit holes in the metering chamber for secondary current transformer meter wiring shall be provided with suitable grommets or bushings to protect the conductor insulation or sheathing. Holes shall be sized for the passage of these conductors only. (Refer to AS/NZS 3000 (Wiring Rules)).

9.6.6 The minimum space to mount and gain access to current transformers is shown in TABLE 9.2. Drawing ECMM 9.2 shows typical arrangements for the equipment within the current transformer chamber.

Fuse blocks may be mounted on the side of the enclosure provided the minimum clearances to busbars and live parts are maintained for safe removal of fuses.

Busbars or cables shall be evenly spaced to facilitate current transformer removal and replacement.

A minimum clearance of 20mm is required around each current transformer.

Note: Refer to Drawing ECMM 9.2 in conjunction with TABLE 9.2.

TABLE 9.2

Type of CT	In Line Mounting		Staggered Mounting	
	Min. Width of Opening Dim. "a" Dia. 1 (mm)	Min. Width of Opening Dim. "b" Dia. 1 (mm)	Min. Width of Opening Dim. "a" Dia. 2 (mm)	Min. Width of Opening Dim. "b" Dia. 2 (mm)
S (200/5)	450	350	360	450
T (800/5)	550	400	480	500
W (1500/5)	650	450	570	550

9.6.7 To gain access to any current transformer or voltage circuit fuses it shall not be necessary to interrupt supply to a *customer*.

9.7. Installation Requirements for Current Transformers

9.7.1 Refer to Drawing ECMM 9.3 for general dimensions and mounting of current transformers for correct polarity.

9.7.2 Current transformers shall be installed in a manner that facilitates replacement and mounted with suitably sized bolts, nuts and washers (self tapping screws are not permitted). A readily removable section of busbar as shown in Drawing ECMM 9.2 shall be provided within the current transformer chamber.

9.7.3 The current transformer secondary terminals shall be readily accessible and between 500mm and 1800mm from floor or ground level to allow access to terminals without undue risk to personnel when the switchboard is live.

9.8. Voltage Circuit Fuses

9.8.1 Voltage circuit fuses shall be mounted in such a manner that the fuse carriers may be removed, replaced and sealed without undue risk to personnel when

the switchboard is live (generally facing the front of the chamber). (Refer to Clause 9.6.6 and Drawing ECMM 9.4).

9.8.2 A sealable fuse mounting block with HRC fuse cartridges shall be used on all new work and when upgrading existing installations. (Refer to Clause 9.4 and Drawing ECMM 9.4).

9.8.3 The voltage circuit fuses shall be connected in such a manner that the energising current of the meter voltage coil will not be registered through the current transformers (i.e. should be connected to line side of the current transformers).

9.8.4 The supply conductors to the voltage circuit fuses shall be as short as practicable, in no case exceed 500mm in length and be separated from bare live busbars. The conductors shall be a minimum of 10mm² PVC insulated and sheathed cables of not more than 7 strands. No joints are permitted in these conductors. Where colour coded cables are unavailable, colour coding shall be provided by the use of appropriate coloured sleeving at both ends with a minimum length of 150mm at each end. (Refer to Drawing ECMM 9.6).

9.9. Meter Panels for *Current Transformer Metering*

9.9.1 In general, meter panels for current transformer metering shall be installed remote from the switchboard. A separate meter panel is required for the metering equipment of each NMI.

Exception: Approval will be given for panels to be mounted within switchboards provided the:

(a) Switchboard is readily accessible for meter reading. (Refer to Clause 7.7); and

(b) The meter panel is dedicated for revenue metering equipment for that NMI; and

(c) The meter panel is shielded and/or sufficiently spaced from electromagnetic fields (refer to Clause 9.11); and

(d) No panels or equipment (including meter panels) shall be mounted in front of the current transformer chamber.

Notes:

1. Maximum distances and required conductor sizes for meter panels installed remote from the switchboard can be determined from TABLE 9.4.
2. *Direct connected meter* wiring is permitted behind or on a current transformer meter panel provided it is for a secondary supply meter associated with the same *customer* (i.e. for the same *NMI*). All *direct connected meter* wiring behind the meter panel shall be separated and segregated from the current transformer meter wiring by enclosure within an earthed metal conduit, trunking or duct.

9.9.2 Unless otherwise approved by the metering provider, a hinged panel with minimum dimensions of 600mm x 600mm shall be provided for the mounting of meters and metering test block on the same vertical surface. (Refer to Drawing ECMM 9.7).

Exception: For single supply current transformer metered installations, meter panels with minimum dimensions of 600mm high X 460mm wide are permitted.

Unless specifically approved by the *metering provider* no customer's equipment or wiring shall be permitted within the meter panel enclosure. (Refer to Drawing ECMM 9.7).

9.9.3 The panel shall be hinged on a vertical edge such that the panel can be opened at least 90° with the meters mounted. (A double offset hinged section may be required).

9.9.4 Meter panels shall be constructed of durable, non-conducting fire resistant material with low water absorption properties.

9.9.5 Meter Panels are required to have provision for sealing.

9.10. Clearances Required for *Current Transformer Metering* Panels

9.10.1 The clearance from the back of the meter panel to the back of the enclosure shall be a minimum of 75mm.

9.10.2 Where meters are enclosed, the clearance between the front of the meter panel and the back of the closed door (including any hat section) shall be not less than 175mm.

9.11. Spacing between Meters and Heavy Current Carrying Conductors

9.11.1 The presence of external magnetic fields from nearby heavy current carrying conductors can cause errors in meter registration. To ensure maximum accuracy of the metering installation it is necessary to take adequate precautions against the effects of external magnetic fields.

9.11.2 Grouped Conductors

There are no special requirements for spacing or shielding where the current is carried by a three phase cable or three single core cables in a trefoil formation.

9.11.3 Separated Conductors

Where conductors of a circuit are physically separated, as in spaced single core cables or busbars, meters must be suitably spaced from the conductors to reduce the effect of the magnetic field.

Where spacing alone cannot be achieved, magnetic shielding of suitable thickness may be used to reduce the minimum clearance by enclosing the conductors in a mild steel pipe or duct or enclosing the meters within a mild steel enclosure. Stainless steel, some alloy steels, aluminium, copper and other non-ferrous metals are not suitable materials for magnetic shielding.

The minimum spacing between revenue meters and conductors carrying heavy currents shall be derived from TABLE 9.3 - intermediate points may be obtained by interpolation.

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TABLE 9.3

Conductor Current (A)	Min Spacing (mm)			
	No Shielding	Thickness of Shielding (mm)		
		1.2	2.5	5.0
150	100	-	-	-
400	500	375	250	125
600	700	525	350	175
1000	900	675	450	225
1500	1200	900	600	300
2000	1400	1050	700	350
3000	1700	1275	850	425
4000	2000	1500	1000	500

Note: Where the above spacing cannot be maintained within the switchboard, it is expected that the meter panel be installed remote from the switchboard. Particular care should be taken when the switchboard is constructed of aluminium or stainless steel.

9.11.4 Under no circumstances shall current transformer meter wiring be grouped with other conductors. Meter wiring run externally to the switchboard enclosure shall be contained within a separate conduit or cable trunking. (Refer to Clause 9.14.5).

Each individual set of current transformer meter wiring installed behind a meter panel containing multiple groups of current transformer meters, shall be grouped and separated from the other sets of current transformer meter wiring.

9.12. Additional Requirements for *Current Transformer Metering*

9.12.1 For all *current transformer metering* (unless an agreement has been negotiated with the *metering provider*), the electrical contractor is responsible for the:

(a) Supply of the meter panel.

(b) Mounting of the meter panel.

(c) Mounting of the current transformers.

(d) Mounting of the voltage fuse block.

(e) Supply and installation of all secondary wiring between the current transformers, test block and meter, including the voltage supply.

(f) Wiring of the meter panel. Surface wiring of meter panels is not permitted.

9.12.2 Where the metering is more complex than a standard installation the *electrical contractor* shall consult with the *metering provider*. The contractor may be required to deliver a suitable metering panel to the *metering provider* for wiring and testing prior to being delivered on site.

Note: Paralleling and summation of *current transformer metering* is not acceptable as it compromises total metering accuracy.

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9.12.3 Current transformers, metering test block, voltage circuit fuses and fuse sealing block will be made available to the *electrical contractor* to install.

To obtain LV *current transformer metering* equipment, *electrical contractors* are required to submit a CT Metering Equipment Order Form that is available from the *distributor's* web site. (Refer to *distributor's* contact details page 1).

Once this form has been approved, LV *current transformer metering* equipment can be issued to the *electrical contractor*.

ENERGEX: LV *current transformer metering* equipment will be issued over the counter directly to the *electrical contractor* from the major depots listed on the CT Metering Equipment Order Form.

Ergon Energy: LV *current transformer metering* equipment can be issued either over the counter directly to the *electrical contractor* from the major depots listed on the CT Metering Equipment Order Form or by mail order to the address supplied on the form.

9.13. *Current Transformer Metering* Test Block

9.13.1 A test block supplied by the *metering provider* shall be incorporated in all installations with current transformer metering. (Refer to Drawing ECMM 9.8).

9.13.2 The test block shall be mounted immediately below, and in the same plane as the current transformer meter, such that the voltage connection terminals are on the right hand side when viewed from the front of the test block. (Refer to Drawings ECMM 9.6 and 9.7).

9.13.3 Connecting wiring shall be enclosed under the test block cover. Surface wiring is not permitted.

9.13.4 Where required by the *metering provider*, a label designating the current transformer ratio shall be fixed to the meter panel approximately 12mm above the centre of the current transformer metering test block.

9.14. Wiring to Current Transformers, Test Blocks etc.

9.14.1 The connections and colour coding shown in Drawing ECMM 9.6 shall be the standard. Where multi-core cables are used for special site requirements (e.g. armoured cables required) the cores must be individually identified. *Current transformer metering* arrangements for 240V and 480V SWER are shown in Section 6, Drawings ECMM 6.3 and 6.4.

Where single insulated grey coloured cable is not available one of the following arrangements may be used:

(a) single double insulated (SDI) cable no larger than 6mm² with grey coloured sheathing; or

(b) black single insulated conductors sleeved at both ends with not less than 300mm of grey coloured sleeving.

9.14.2 All voltage and current meter wiring (other than voltage circuit fuse supply conductors referred to in Clause 9.8.4) shall be PVC insulated stranded cable of no more than 7 strands. No joints are permitted in these conductors. Circuit and route lengths are shown in TABLE 9.4.

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TABLE 9.4

Rated Burden	Max Circuit Length 2.5 mm²	Max Route Length 2.5 mm²	Max Circuit Length 4mm²	Max Route Length 4 mm²	Max Circuit Length 6 mm²	Max Route Length 6 mm²
5 VA	15m	7.5m	25m	12.5m	36m	18m
15 VA	45m	22.5m	80m	40m	—	—
Note: 200/5 ratio CTs are supplied with a rated burden of 5 VA 800/5 and 1500/5 ratio CTs are supplied with a rated burden of 15 VA.						

9.14.3 Where 2.5mm^2 conductors are used the bare ends shall be doubled over prior to connection to the current transformers and test block to facilitate a secure connection to the terminals.

9.14.4 The insulation on all voltage and current meter wiring should be stripped back 15mm (30mm where doubled up 2.5mm^2 is used) to ensure terminal screws make positive contact with the bare conductor. It is essential that terminal screws are connected securely to the bare conductors and not to the insulation of the wiring.

9.14.5 All current transformer wiring shall be enclosed in a continuous conduit, cable trunking or earthed metal duct from the current transformer chamber to the metering enclosure.

9.14.6 *Current transformer metering* secondary wiring shall be earthed as shown in Drawing ECMM 9.6. The earth conductor shall be connected directly to the main earth conductor or earth bar and not to a separate earthed medium such as the switchboard frame.

9.14.7 The earthing conductor shall be PVC insulated stranded cable of no more than 7 strands and can be 2.5mm^2 cable for all *current transformer metering* installations.

9.14.8 A meter neutral label shall be attached to the meter neutral conductor adjacent to its connection to the main neutral. (Refer to Clause 7.14.2 for *metering* neutral conductor connection details).

9.14.9 Cable tails through meter panels should have a minimum length of 150mm to allow for connection into the meters. Current transformer meters will be erected and connected by the *metering provider's* personnel only.

9.14.10 All current transformer metering, wiring and installations are to be completed in accordance with the wiring diagrams in this manual.

9.14.11 To ensure compliance of the current transformer metering, contractors should use the Electrical Contractor's LV CT Metering Check Sheet. This form can be changed to include the contractor's logo and be part of the contractor's quality system. Additional checks can be included if considered necessary.

9.15. Changes to Existing *Current Transformer Metering* Installations

When all or part of the existing metering installation requires changing (e.g. upgrading of a switchboard, change to the type of supply), the *metering provider* may require the total metering installation, including current transformers, to be upgraded to comply with the requirements of this manual and the *National Electricity Rules*.

9.16. Approval of *Current Transformer Metering* Installations by *Ergon Energy*

Ergon Energy requires **all** LV *current transformer metering* installation designs to have prior approval for the metering arrangement. This requires the submission of Switchboard Layout and Single Line Diagrams as early as possible to allow design modifications to be carried out if necessary prior to switchboards being built.

If this information is not provided *Ergon Energy* cannot guarantee supply will be connected if the switchboard does not comply.

This requirement arises from the distances between sites in the *Ergon Energy* area of supply. Early submission of drawings will assist in reducing the time and costs for all parties and avoid late modifications of *current transformer metering* switchboards.

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Electrical Contractor's LV CT Metering Check Sheet

Address Where CT Metering Installed:

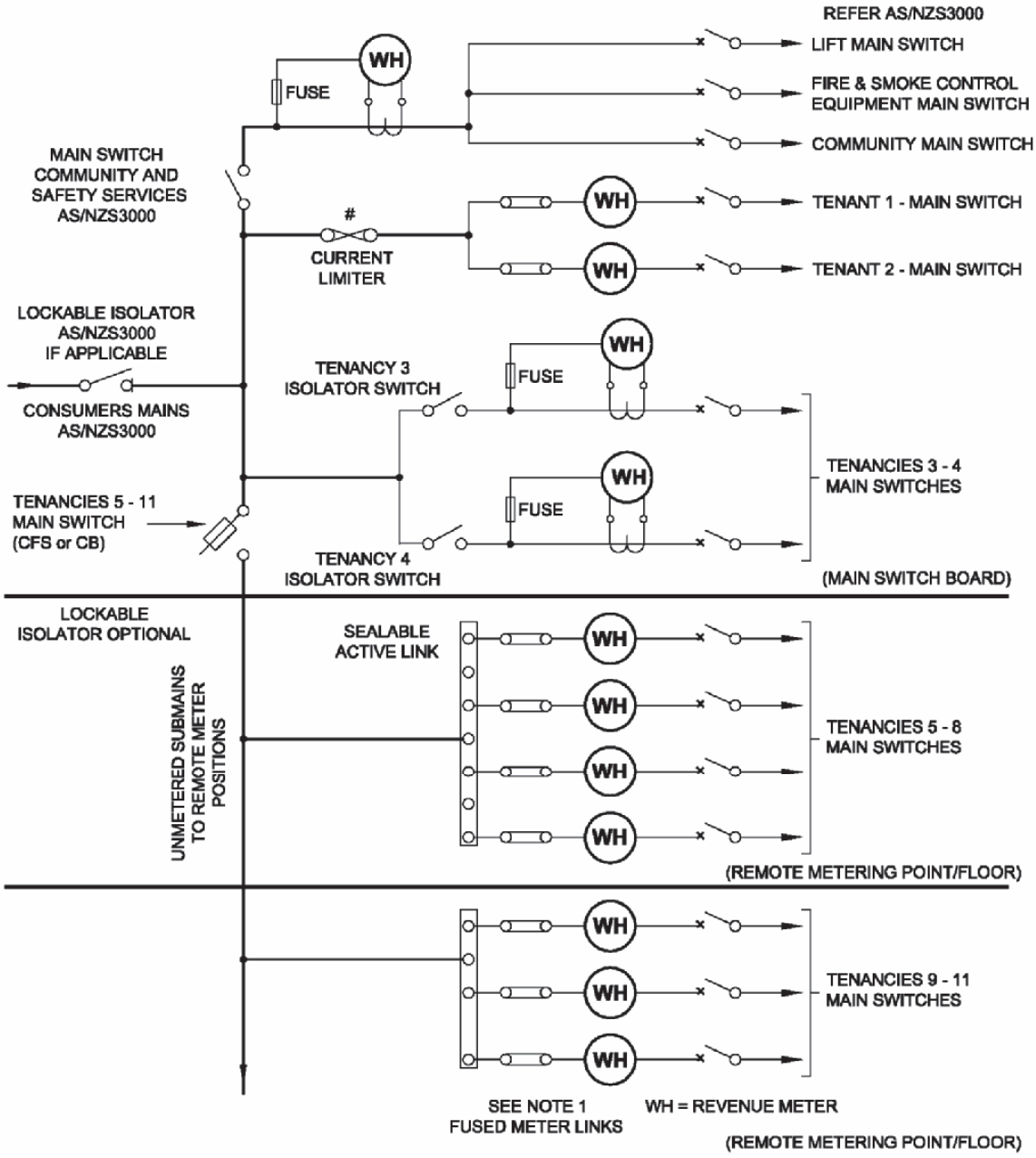
National Metering Identifier (NMI) (If known):

Details of Electrical Mechanic Responsible for Testing of CT Installation:

Name: Licence No:

Pre-commissioning Checks

Clause No.	Checklist	Checked	Comments
	Switchboard/CT Chamber		
9.2	Lockable isolator on line side of CTs:		
9.6.1	Dedicated CT chamber provided:		
9.6.2	CT chamber correctly labelled:		
9.6.4	Removable CT chamber cover fitted with 2 handles:		
	Current Transformers		
9.5	CT ratio matches expected load:		
9.6.3	No exposed live parts within CT chamber:		
9.7.1	Primary and secondary polarity is correct:		
9.7.2	Removable bus bars allow CTs to be easily replaced:		
9.7.3	CT secondary terminals are accessible:		
	Voltage Circuit Fuses		
9.8.1	Fuses carriers are accessible and easily removable:		
9.8.3	Fuses are connected to the line side of the CTs:		
9.8.4	Cables from bus bars to fuses are ≤ 500mm and a minimum. of 10mm^2 SDI:		
9.8.4	Correct marking of cables from bus bars to fuses (e.g. trace or bell out cables):		
	Meter Neutral & Earthing		
AS/NZS 3000	Test continuity to confirm that cabinets are earthed:		
9.14.8	Meter neutral is connected to main neutral and meter neutral label is attached:		
	Meter Panel Wiring & Test Block		
9.9.2	Meter panel size is minimum 600 x 600mm (or 460 x 600mm for single tariff CT installation):		
7.12	Meters are mounted at correct height:		
9.9.3	Meter panel is hinged:		
9.11	Meters and wiring spaced from heavy current carrying conductors:		
9.13.2	Test block is mounted correctly:		
9.14.1	Colour coding is correct:		
9.14.2	Meter wiring is correct size for circuit length:		
9.14.6	Secondary returns are starred and earthed:		
	Sealing		
7.19	CT chamber, voltage circuit fuses and meter panel are sealable:		



NOTES:

1. INSTALL METERING ISOLATION / FUSED LINKS BEFORE EACH WHOLE CURRENT METER SHOWN AS WH

   USE APPROVED BACK WIRED METERING ISOLATION LINKS FITTED WITH 100 Amp HRC FUSE CARTRIDGES AS PER DRAWING ECMM 7.1.

2. ALL ISOLATORS AND MAIN SWITCHES BEFORE METERING EQUIPMENT TO BE LOCKABLE (ON & OFF). ALSO REFER TO AS/NZS3000.

3. WHERE CIRCUIT BREAKERS ARE USED IN PLACE OF ISOLATION SWITCHES THEY MUST DISCRIMINATE AND COORDINATE IN ACCORDANCE WITH AS/NZS3000. CASCADING OF CIRCUIT BREAKERS IS TO COMPLY WITH THE MANUFACTURER'S REQUIREMENTS AND AS/NZS3000.

4. CURRENT LIMITING DEVICE FOR THE PROTECTION OF WHOLE CURRENT METERING CIRCUITS TO COMPLY WITH AS/NZS3000.

Revision: B	TYPICAL CT. AND DIRECT CONNECTED MULTI-CUSTOMER METERING ARRANGEMENT	ECMM - 9.1-1

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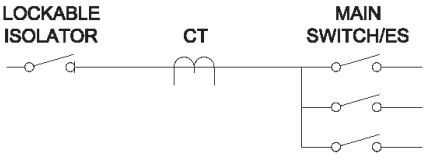
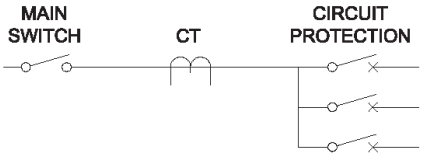
SINGLE CT CUSTOMERS

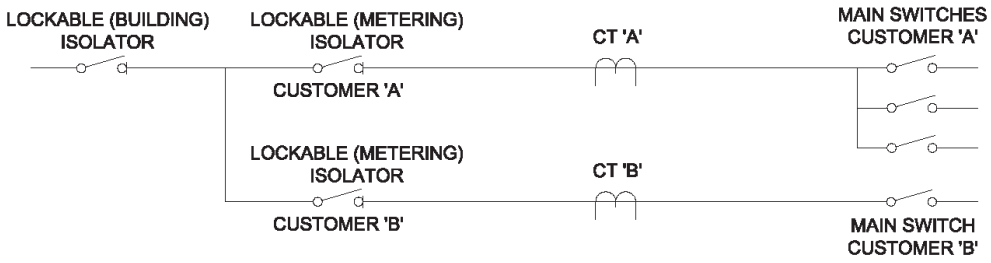
PREFERRED ARRANGEMENT FOR ALL SINGLE CT CUSTOMERS (MANDATORY FOR SPECIFIC CUSTOMERS DETAILED IN 9.2.1(a)



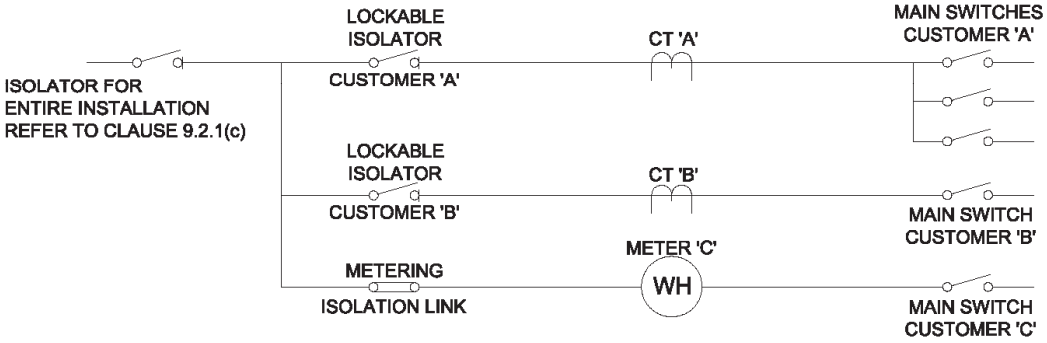
ALTERNATIVE ARRANGEMENT FOR NON-SPECIFIC CUSTOMERS (REFER 9.2.1(b))



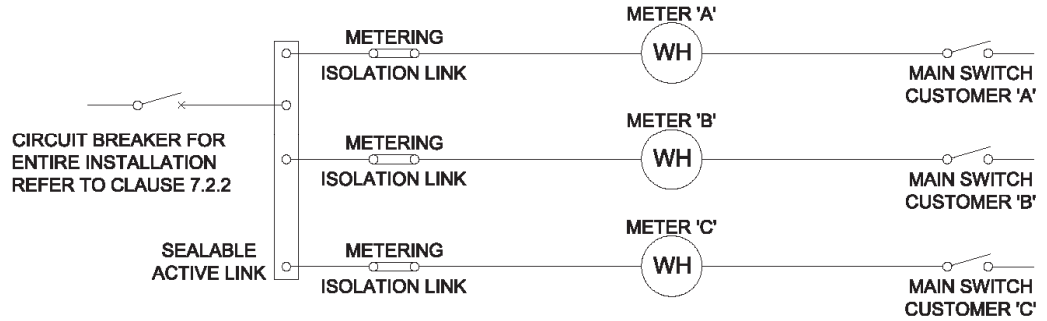
MULTIPLE CT CUSTOMERS (NO DISTRIBUTOR LV ISOLATION)



MULTIPLE CT & DIRECT CONNECTED METERED CUSTOMERS (DISTRIBUTOR LV ISOLATION)



MULTIPLE DIRECT CONNECTED METERED CUSTOMERS (DISTRIBUTOR LV ISOLATION)



TYPICAL EXAMPLES OF MAIN SWITCHBOARD METERING ARRANGEMENTS

NOTE:
WHERE SERVICE FUSES ARE GREATER THAN 100A THE METERING ISOLATION LINKS ARE TO BE REPLACED BY 100A HRC FUSE CARTRIDGES.

Revision: A	MULTI-CUSTOMER METERING ARRANGEMENTS TYPICAL CT & DIRECT CONNECTED METERING SINGLE LINE DIAGRAM	ECMM - 9.1-2

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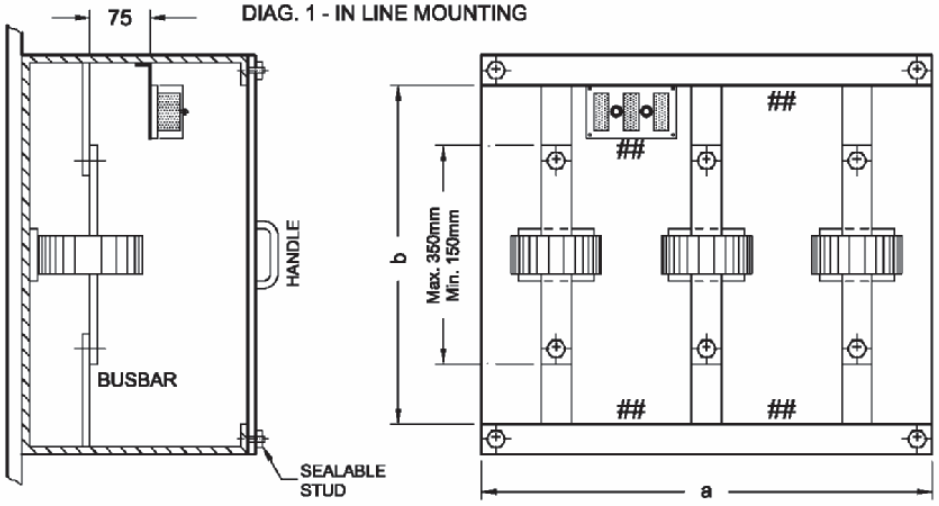
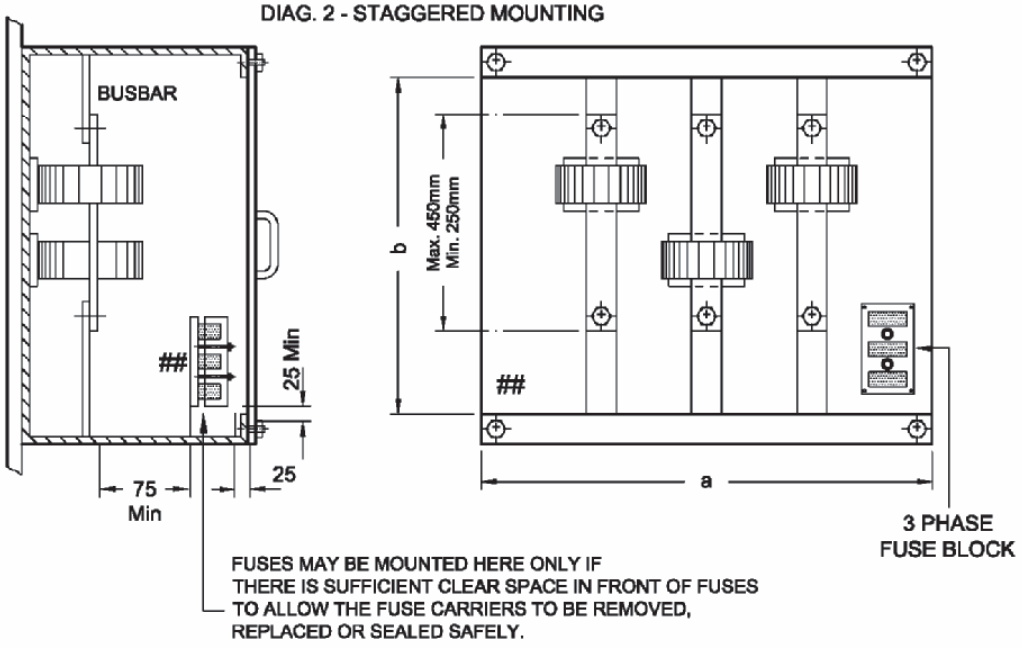
REFER TO TABLE 9.2 FOR DIMENSIONS

DIAG. 1 - IN LINE MOUNTING



FUSES MOUNTED IN THESE POSITIONS MUST ALLOW SAFE ACCESS TO BUSBAR CONNECTIONS AND FUSE CARRIERS.

DIAG. 2 - STAGGERED MOUNTING



FUSES MAY BE MOUNTED HERE ONLY IF THERE IS SUFFICIENT CLEAR SPACE IN FRONT OF FUSES TO ALLOW THE FUSE CARRIERS TO BE REMOVED, REPLACED OR SEALED SAFELY.

NOTES:
1. VOLTAGE FUSE BLOCKS MAY BE MOUNTED ON EITHER FRONT OR SIDE OF ENCLOSURE FOR EACH CT. ARRANGEMENT.
2. ALL LIVE CONDUCTORS TO BE INSULATED - BUSBAR AND CABLE BOLTED CONNECTIONS TO BE COVERED WITH NON-ADHESIVE INSULATION, ADEQUATELY SECURED IN PLACE BY CABLE TIES.

Revision: B	TYPICAL CT. CHAMBER EQUIPMENT ARRANGEMENTS SINGLE CUSTOMER INSTALLATION	ECMM - 9.2

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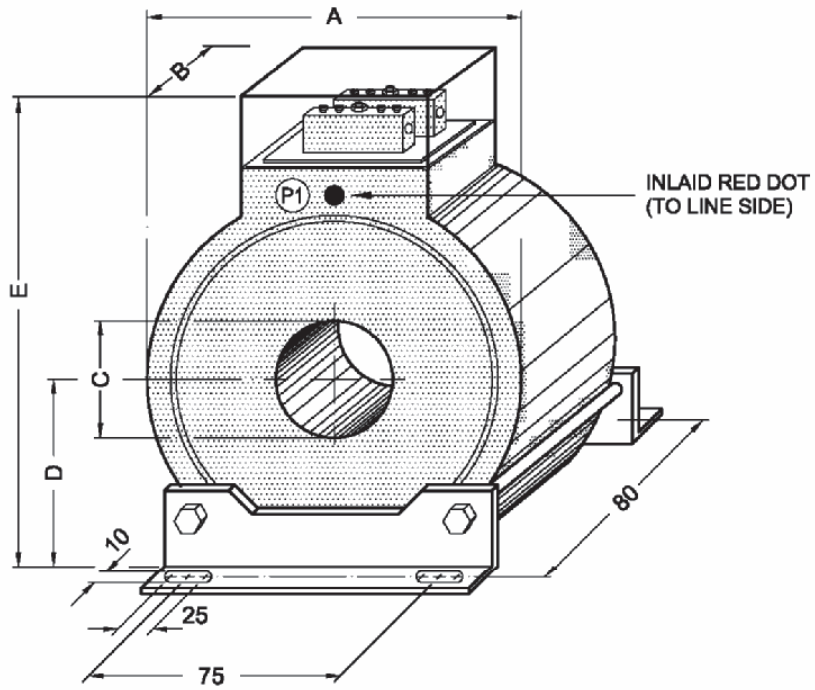
TYPICAL ENCAPSULATED
CURRENT TRANSFORMER
TYPE S, T & W.



C.T. DESIGNATION	MAX. WIDTH A	MAX. THICKNESS B	MIN. WINDOW DIAMETER C	POSITION OF WINDOW CENTRE D	MAX. HEIGHT E	CT. RATIO
S	130	70	45	65	170	200/5 0.5S ext 200%
T	165	65	80	85	210	800/5 0.5S ext 200%
W	170	65	112	85	220	1500/5 0.5S ext 250%

Revision: B	METERING CURRENT TRANSFORMERS GENERAL DIMENSIONS	ECMM - 9.3

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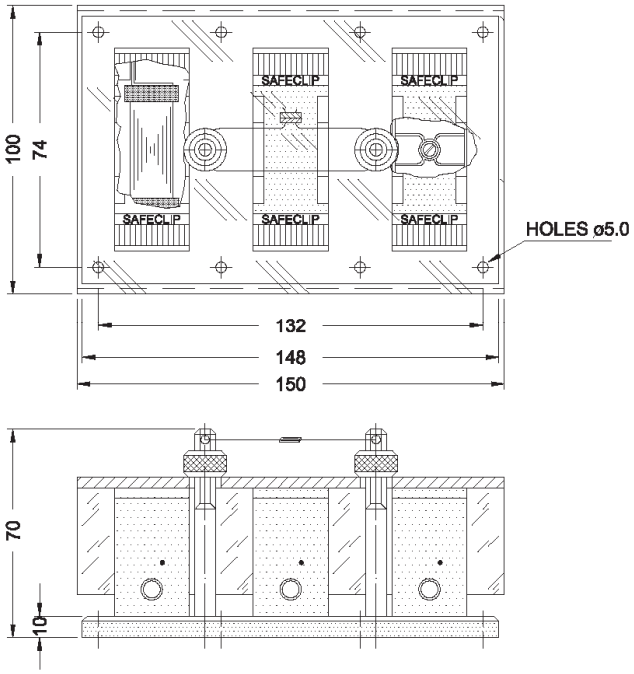
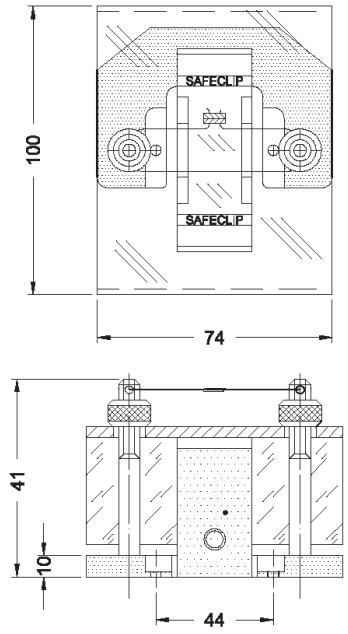
3Ø FUSE SEALING BLOCK



SINGLE FUSE SEALING BLOCK



Revision: A	METERING FUSE SEALING BLOCKS GENERAL ARRANGEMENT	ECMM - 9.4

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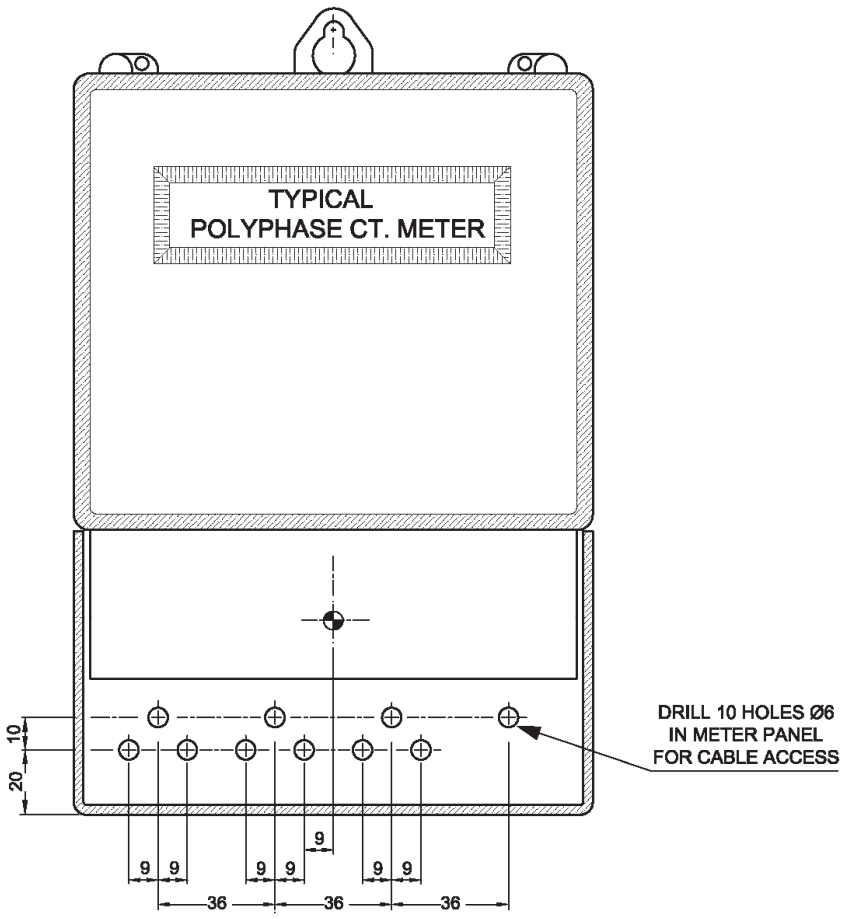

Revision:		
A	POLYPHASE CT. kWh METER DRILLING DETAILS FOR CABLE ACCESS	ECMM - 9.5

Joint document between ENERGEX and Ergon Energy
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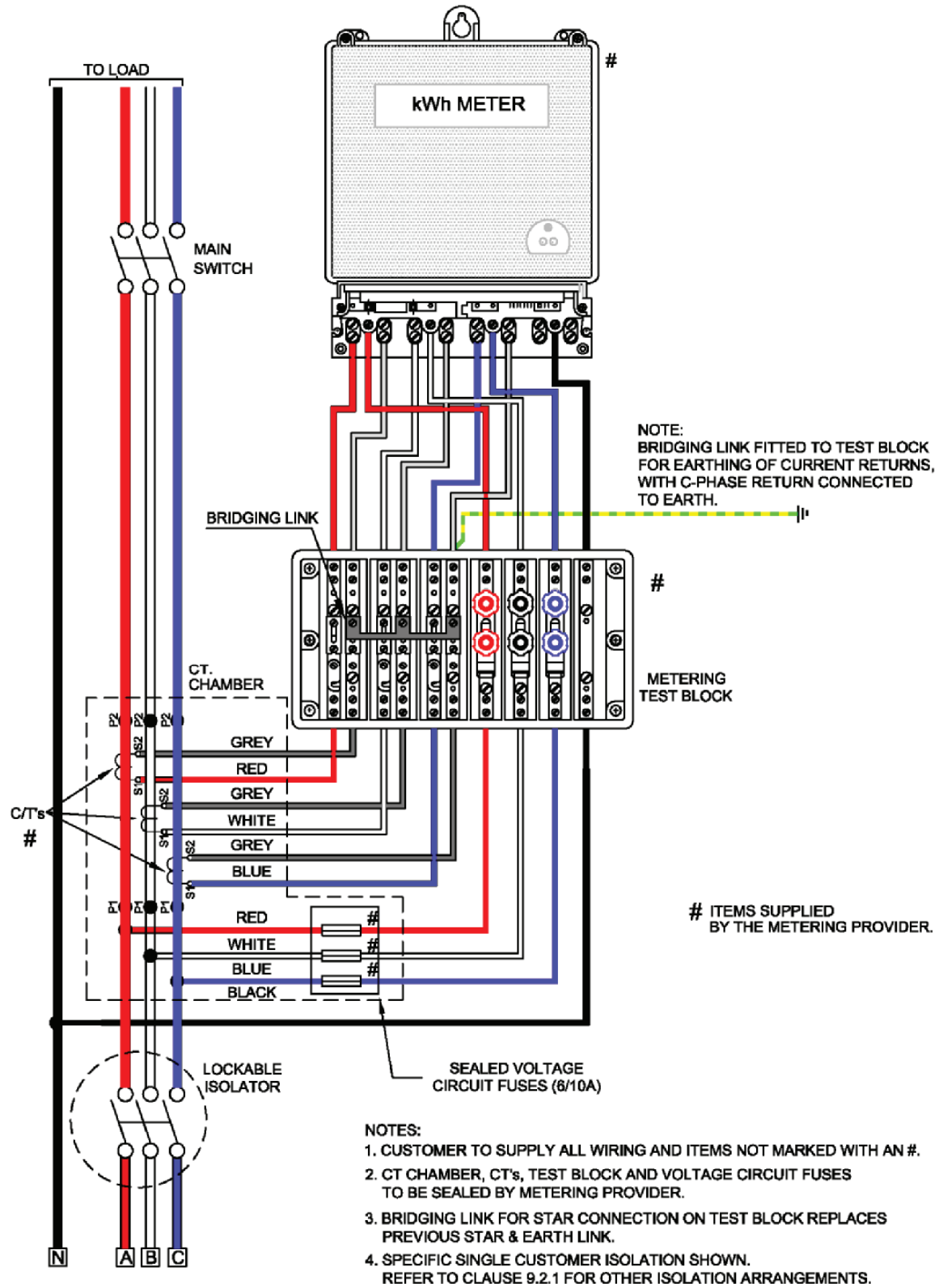

NOTES:

1. CUSTOMER TO SUPPLY ALL WIRING AND ITEMS NOT MARKED WITH AN #.
2. CT CHAMBER, CT's, TEST BLOCK AND VOLTAGE CIRCUIT FUSES TO BE SEALED BY METERING PROVIDER.
3. BRIDGING LINK FOR STAR CONNECTION ON TEST BLOCK REPLACES PREVIOUS STAR & EARTH LINK.
4. SPECIFIC SINGLE CUSTOMER ISOLATION SHOWN. REFER TO CLAUSE 9.2.1 FOR OTHER ISOLATION ARRANGEMENTS.

Revision: B	LOW VOLTAGE CT. METERING WIRING DIAGRAM CONNECTION WIRING DIAGRAM	ECMM - 9.6

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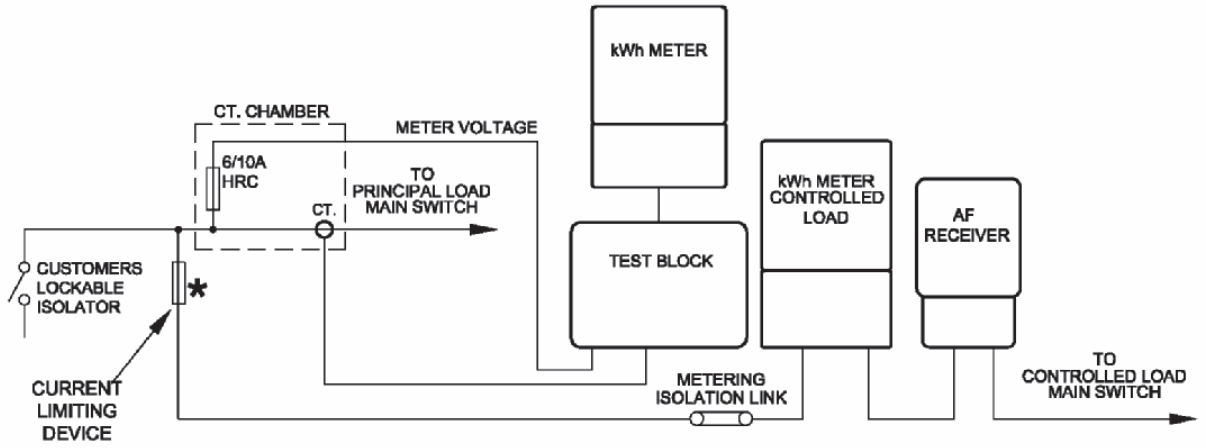
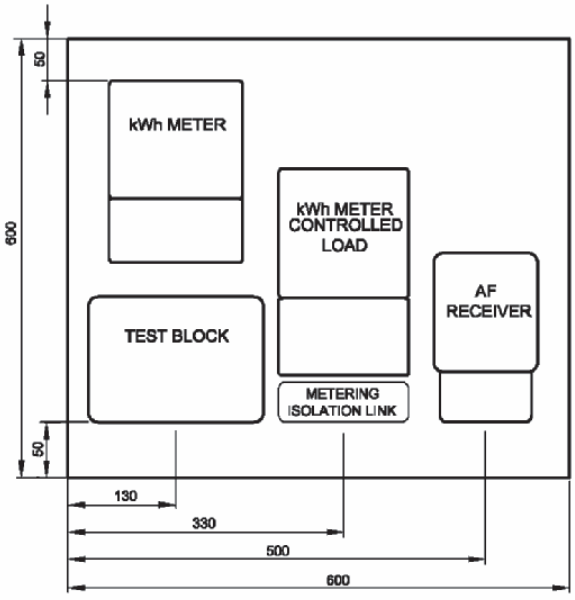


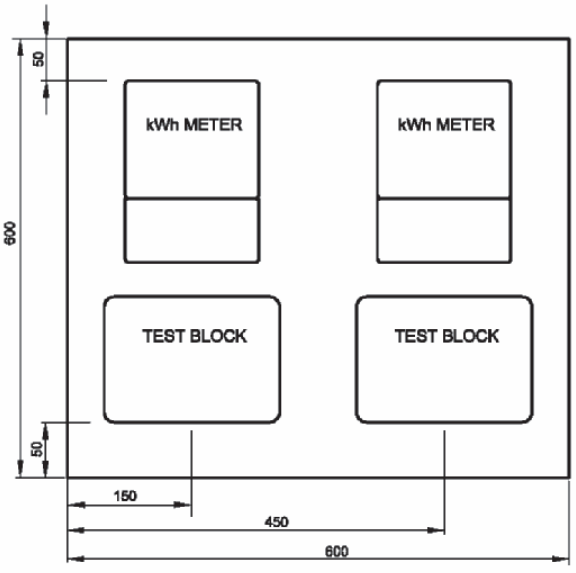
NOTES:

1. * CURRENT LIMITING DEVICES FOR THE PROTECTION OF WHOLE CURRENT METERING CIRCUITS SHALL COMPLY WITH AS3000 AND IN NO CASE SHALL BE RATED GREATER THAN A 100A HRC FUSE OR EQUIVALENT.
2. THE METERING PROVIDER MAY USE AN INTEGRATED METER IN PLACE OF THE SEPARATE CONTROLLED LOAD METER AND AF RECEIVER.

TYPICAL LAYOUT OF A CURRENT TRANSFORMER OPERATED METER PANEL INCORPORATING A DIRECT CONNECTED METER FOR A SEPARATE CONTROLLED SUPPLY.



TYPICAL LAYOUT FOR SINGLE NMI CT. METERING



NOTE:
REFER TO CLAUSE 9.9.2.

Revision: B	CT. OPERATED METER PANEL & SCHEMATIC LAYOUT SINGLE LINE DIAGRAM	ECMM - 9.7

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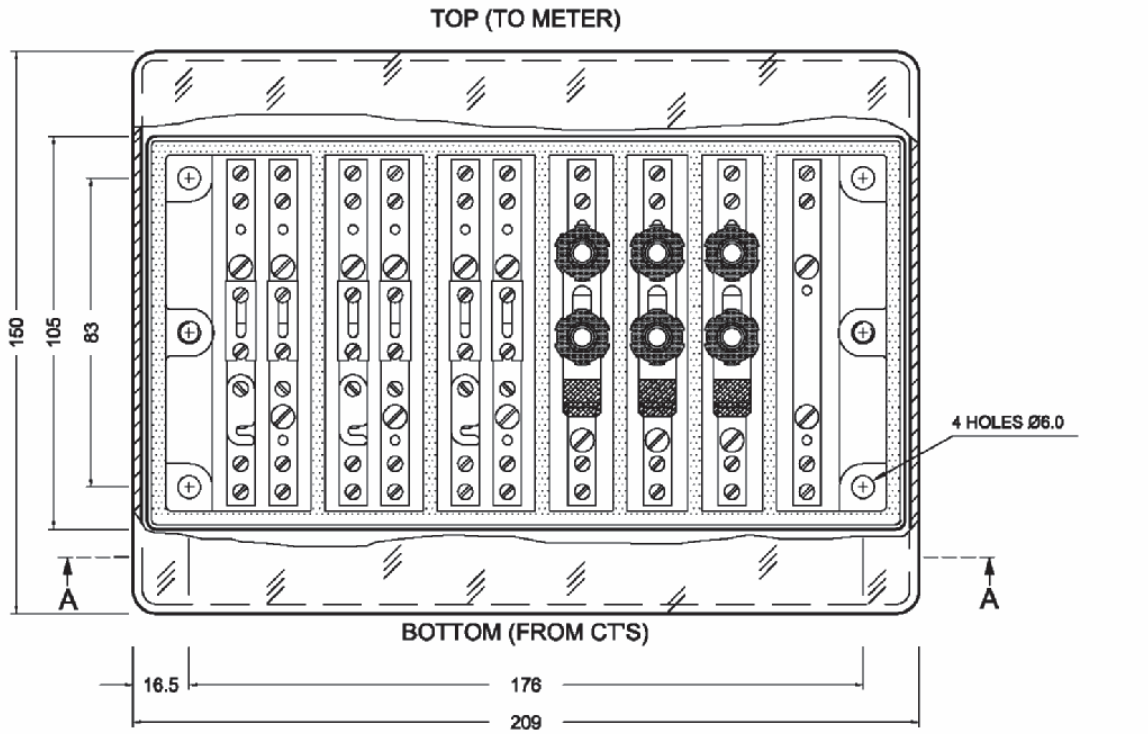

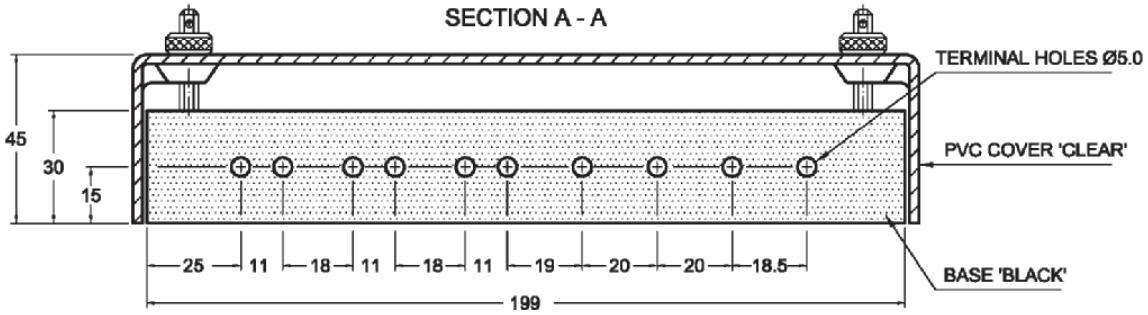

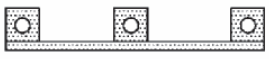

BRIDGING LINK

BRIDGING LINK FITTED TO TEST BLOCK
FOR EARTHING OF CURRENT RETURNS WITH C-PHASE.
RETURN CONNECTED TO EARTH.

NOTE:
TEST BLOCK MUST BE MOUNTED WITH VOLTAGE CONNECTION TERMINALS ON RIGHT HAND SIDE.

Revision:		
B	TEST BLOCK MOUNTING DETAIL & TERMINAL ARRANGEMENT	ECMM - 9.8

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10. METERING ARRANGEMENTS FOR INVERTER ENERGY SYSTEMS CONNECTED TO THE DISTRIBUTION NETWORK

10.1. Explanation of Schemes Available

Two metering schemes are available for the grid-connected Inverter Energy Systems (*IES*), known as the "*Net Energy*" and the "*Gross Energy" schemes* (also known as Embedded and Dedicated *IES* systems respectively). All *IES* installations must be compliant with AS4777.

The Queensland Government Solar Bonus Scheme requires the installation of a *Net Energy* metering solution.

The *Net Energy* metering scheme has a single electronic import and export register meter installed in the place of the existing general supply energy consumption meter(s).

The *Gross Energy* metering scheme has an additional single electronic import and export register meter installed on the existing meter panel for *IES* supply energy generation only.

Controlled load metering arrangements are unaffected by the installation of an *IES*.

IES installations can have an installed capacity of up to 10kVA single phase (peak) or 30kVA three phase (peak).

10.2. Agreements

All *IES customers* must have an IES Network Connection Agreement in place with the *distributor* before the *IES* system can be connected to the *distributor's* supply network. Queensland Government Solar Bonus Scheme *customers* must also advise their *retailer* that they are participating in the scheme. Refer to the Queensland Government Web site www.cleanenergy.qld.gov.au/solar_bonus_scheme.cfm.

The customer's *EC* shall nominate the metering scheme on the application form for network connection of an IES, and the electrical contractor shall nominate the metering scheme on their *approved form* sent to the distributor.

Customers wishing to be compensated for any electricity exported by the *IES* to the *distributor's* supply network other than through the Queensland Government Solar Bonus Scheme must also have a Power Purchase Agreement in place with their *retailer*.

10.3. Approval of Equipment

Typical *direct connected metering* arrangements have been developed in line with *IES* requirements and *retailer* offered supply types, these are shown in Drawings ECMM 10.1 to 10.11 and Section 6, Drawing ECMM 6.5 for a direct connected SWER IES.

For the "*Net Energy Scheme*" Drawings ECMM 10.1 to 10.5 cover typical single and three phase supply/service connections for single and polyphase inverter energy systems, compliant to AS 4777.1.

For the "*Gross Energy Scheme*" Drawings ECMM 10.6 to 10.11 cover typical single and three phase supply/service connections for single and polyphase inverter energy systems compliant to AS 4777.1.

Notes:

1. Exceptions to the above standards may be approved upon receipt of a written application in exceptional circumstances. Applications shall be made in writing to the *distributor*. Standard charges will apply for such arrangements.

2. It must be noted that the "*Gross Scheme*" will require an additional meter, and the end user must be made aware that provision of this space is required at the current metering location.
3. In a *"Net Scheme"*, if the principal metering has more than one phase, then a polyphase meter must be used.

10.4. *Current Transformer Metering* Arrangements

For a *Net Energy Scheme* on a current transformer metered premises the Inverter Energy System is unlikely to exceed the *customers* minimum load. Under these circumstances metering will need to be considered on a case-by-case basis.

Note: For a *Gross Energy Scheme* on a current transformer metered installation the separately connected *IES* supply may require the inclusion of a fault current limiting device.

10.5. Labelling Requirements to AS 4777.1

The installation must be compliant with the labelling requirements of AS 4777.1 for Grid Connected Inverter Energy Systems.

10.5.1 Additional Labelling

Where required, the meter and isolator are to include a label detailing the *NMI*, address, unit or shop number etc.

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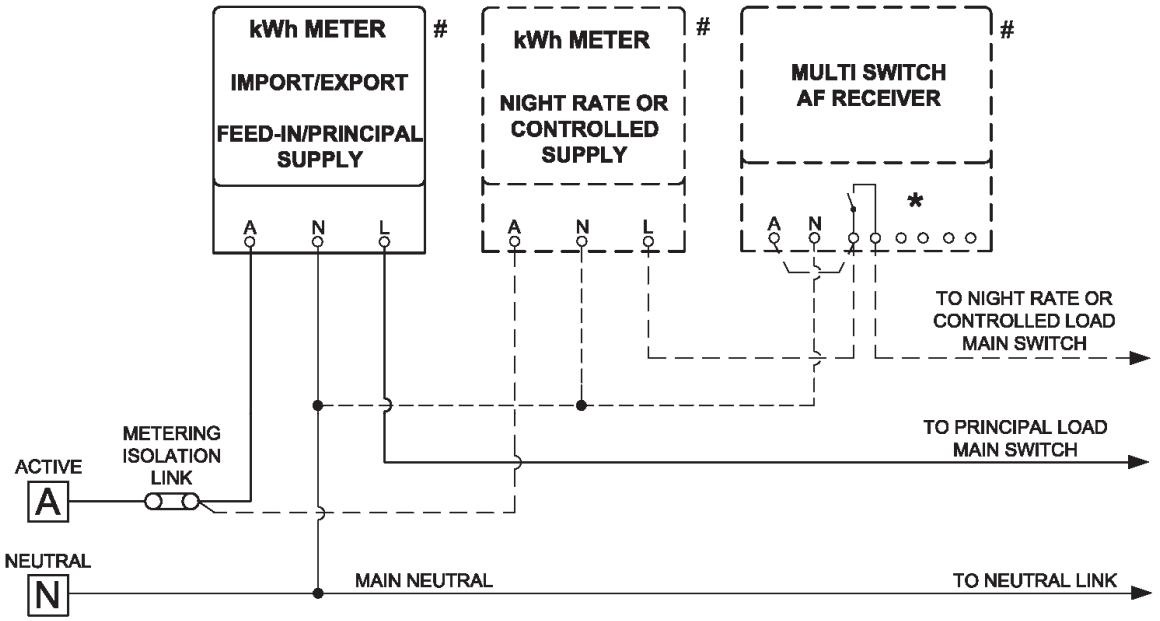
ENERGEX ONLY

SINGLE PHASE
GRID CONNECTED
INVERTER ENERGY SYSTEM
IN A SINGLE PHASE SUPPLY/SERVICE
WITH OPTIONAL LOAD CONTROL

NET ENERGY METERING SCHEME



ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:
1. INVERTER ENERGY SYSTEM (IES), COMPLIANT TO AS4777, CONNECTED WITHIN THE INSTALLATION ON THE CUSTOMERS SIDE OF THE PRINCIPAL LOAD MAIN SWITCH.
2. DOTTED LINES INDICATE VARIOUS SUPPLY OPTIONS.
3. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
4. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED.
5. METERS, METERING ISOLATION LINK AND AF RECEIVER TO BE SEALED BY METERING PROVIDER.

Revision: A	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBUTOR'S NETWORK	ECMM - 10.1

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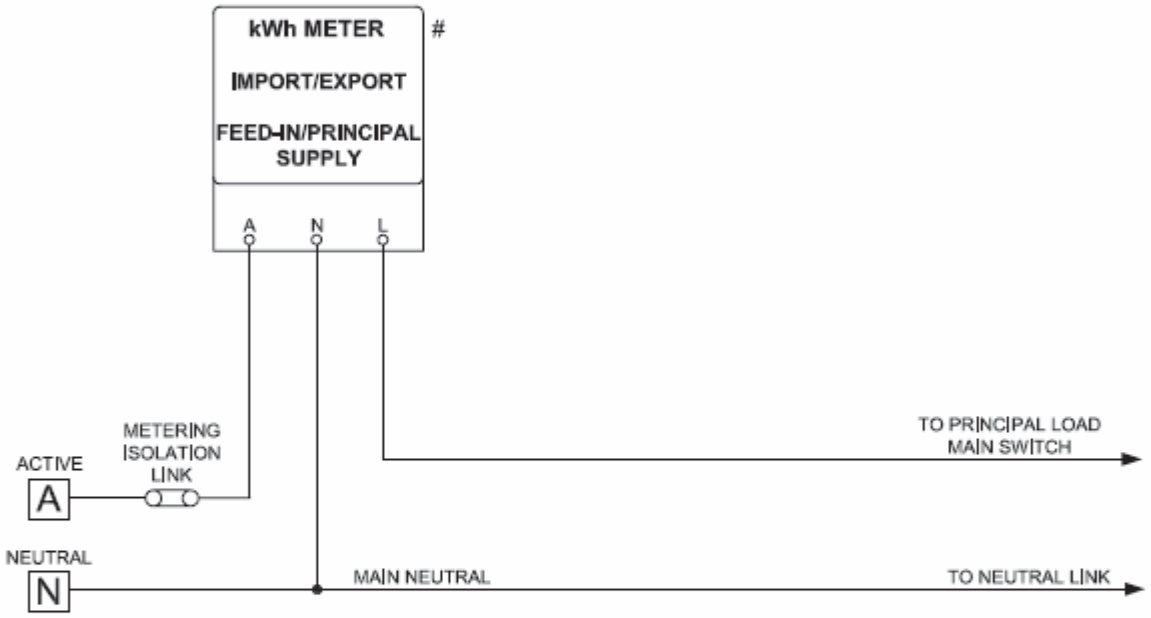
ERGON ENERGY ONLY

SINGLE PHASE
GRID CONNECTED
INVERTER ENERGY SYSTEM
IN A SINGLE TARIFF SINGLE PHASE
SUPPLY/SERVICE ARRANGEMENT

NET ENERGY METERING SCHEME



ITEMS SUPPLIED BY METERING PROVIDER.
● SOLDERED CONNECTION.

NOTES:
INVERTER ENERGY SYSTEM (IES), COMPLIANT TO AS4777, CONNECTED WITHIN

1. THE INSTALLATION ON THE CUSTOMERS SIDE OF THE PRINCIPAL LOAD MAIN SWITCH.
2. 2 ELEMENT METERS ARE TO BE UTILISED IF MORE THAN 1 TARIFF AT THE PREMISE AS PER DRAWING 10.2 - 10.3.
3. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
4. METERS, METERING ISOLATION LINK AND AF RECEIVER TO BE SEALED BY METERING PROVIDER.

Revision: A	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBUTOR'S NETWORK	ECMM - 10.1.1

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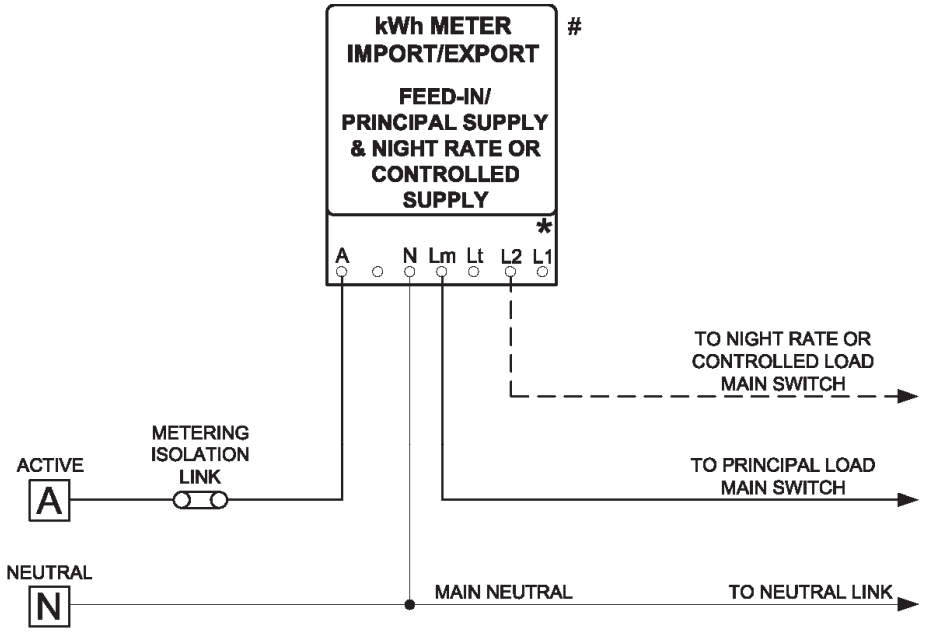
ENERGEX AND NON-RIPPLE CONTROL AREAS OF ERGON ENERGY ONLY

SINGLE PHASE GRID CONNECTED INVERTER ENERGY SYSTEM IN A SINGLE PHASE SUPPLY/SERVICE WITH OPTIONAL LOAD CONTROL

NET ENERGY METERING SCHEME



ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:

1. THIS ARRANGEMENT APPLIES TO NON-RIPPLE CONTROL AREAS OF ERGON ENERGY AND FOR LIMITED USE WITHIN ENERGEX WHERE SWITCHBOARD SPACE IS RESTRICTED (REF. CLAUSE 6.3).
2. INVERTER ENERGY SYSTEM (IES), COMPLIANT TO AS4777, CONNECTED WITHIN THE INSTALLATION ON THE CUSTOMERS SIDE OF THE PRINCIPAL LOAD MAIN SWITCH.
3. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
4. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED.
5. DOTTED LINES INDICATE VARIOUS CONTROL OPTIONS.
6. METER AND METERING ISOLATION LINK TO BE SEALED BY METERING PROVIDER.

Revision: A	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBUTOR'S NETWORK	ECMM - 10.2

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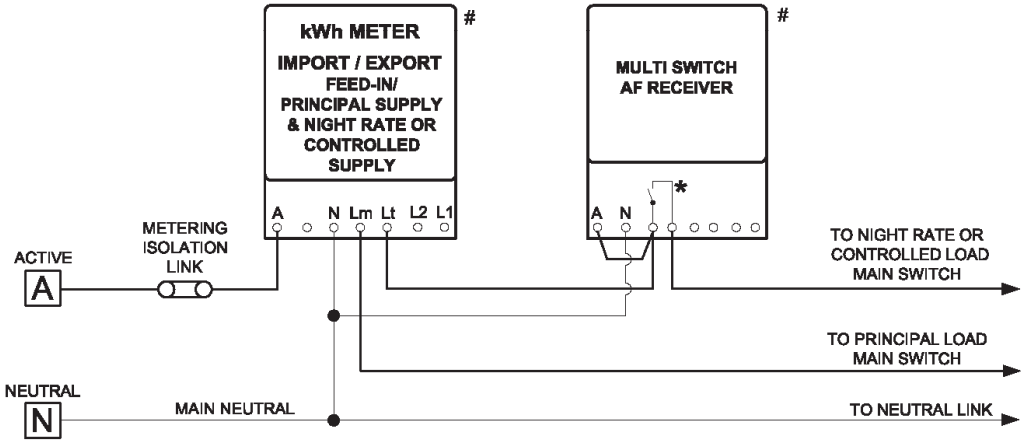
RIPPLE CONTROL AREAS OF ERGON ENERGY ONLY

SINGLE PHASE
GRID CONNECTED
INVERTER ENERGY SYSTEM
IN A SINGLE PHASE SUPPLY/SERVICE
WITH LOAD CONTROL

NET ENERGY METERING SCHEME



\# ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.1

2. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED SEE DRAWING ECMM 8.12.

3. CONTROLLED CIRCUITS ASSOCIATED WITH SECONDARY SUPPLY CONNECTED TO UNSWITCHED TERMINAL Lt. OF TWO ELEMENT METER.

4. TWO ELEMENT METER TERMINAL DESCRIPTION.

1	A - ACTIVE IN
3	N - NEUTRAL IN
4	Lm - ELEMENT 1 (MAIN - PRIMARY LOAD / IES SUPPLY)
5	Lt - ELEMENT 2 (UNSWITCHED - SECONDARY TARIFF)
6, 7	L1 & L2 - NOT USED IN RIPPLE AREAS

5. BI-DIRECTIONAL SINGLE PHASE ELECTRONIC METER REQUIRED FOR IMPORT / EXPORT ENERGY REGISTRATION.

6. INVERTER ENERGY SYSTEM (IES), COMPLIANT TO AS4777 CONNECTED WITHIN THE INSTALLATION ON THE CUSTOMERS SIDE OF THE PRINCIPAL LOAD MAIN SWITCH.

7. SAME METER CONNECTION AS DRG. ECMM 8.4.

8. METER, METERING ISOLATION LINK AND AF RECEIVER TO BE SEALED BY METERING PROVIDER.

Revision: A	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBUTORS NETWORK	ECMM - 10.3

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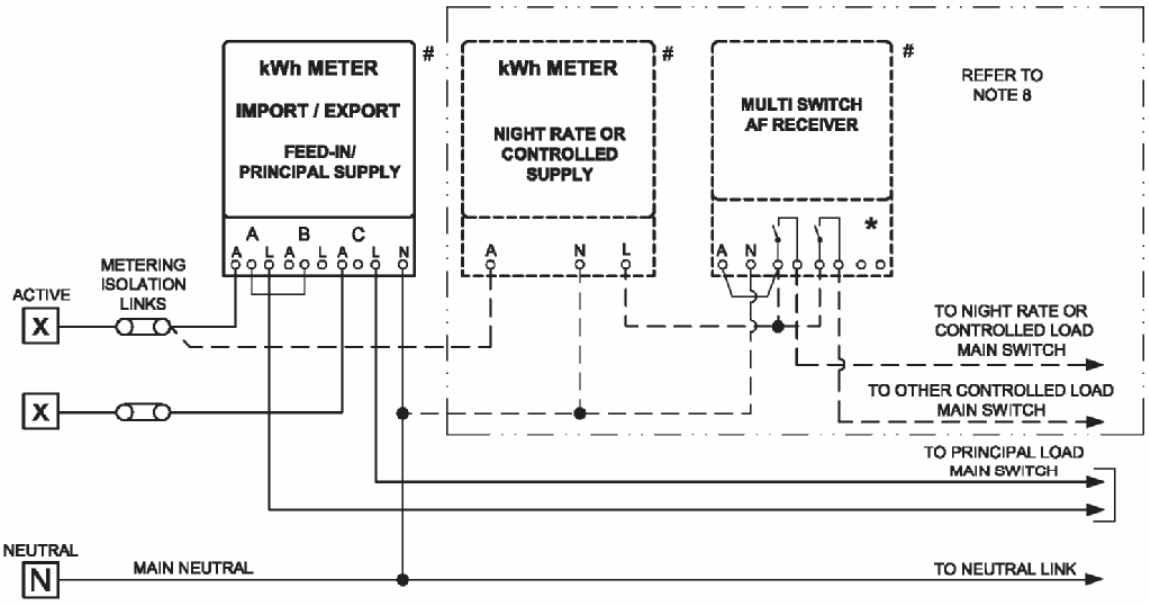
ERGON ENERGY ONLY

SINGLE PHASE GRID CONNECTED INVERTER ENERGY SYSTEM IN A TWO PHASE SUPPLY/SERVICE WITH OPTIONAL LOAD CONTROL

NET ENERGY METERING SCHEME



ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:

1. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
2. WHERE RESISTIVE LOAD EXCEEDS 30A OR RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED. SEE DRAWING ECMM 8.8.
3. BI-DIRECTIONAL POLYPHASE ELECTRONIC METER IS REQUIRED FOR IMPORT / EXPORT ENERGY REGISTRATION.
4. INVERTER ENERGY SYSTEM (IES) COMPLIANT TO AS4777 CONNECTED WITHIN THE CUSTOMERS SIDE OF THE PRINCIPAL LOAD MAIN SWITCH.
5. 'A' PHASE VOLTAGE TERMINAL OF METER TO BE BRIDGED TO 'B' PHASE VOLTAGE TERMINAL.
6. LABEL TO BE APPLIED TO METER "METER READER TO IGNORE WARNING CODES". (LABEL ONLY APPLIES FOR Q4 METERS).
7. TWO PHASE SUPPLY CONNECTED TO 'A' AND 'C' PHASE TERMINALS OF POLYPHASE METER.
8. IN NON-RIPPLE CONTROL AREAS, THE SINGLE kWh METER/AF RECEIVER COMBINATION TO BE REPLACED WITH A 2 ELEMENT METER. SEE DRAWING ECMM 8.3
9. DOTTED LINES INDICATE VARIOUS CONTROL OPTIONS.
10. METER, METERING ISOLATION LINK AND AF RECEIVER TO BE SEALED BY METERING PROVIDER.

Revision: B	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBTOR'S NETWORK	ECMM - 10.4

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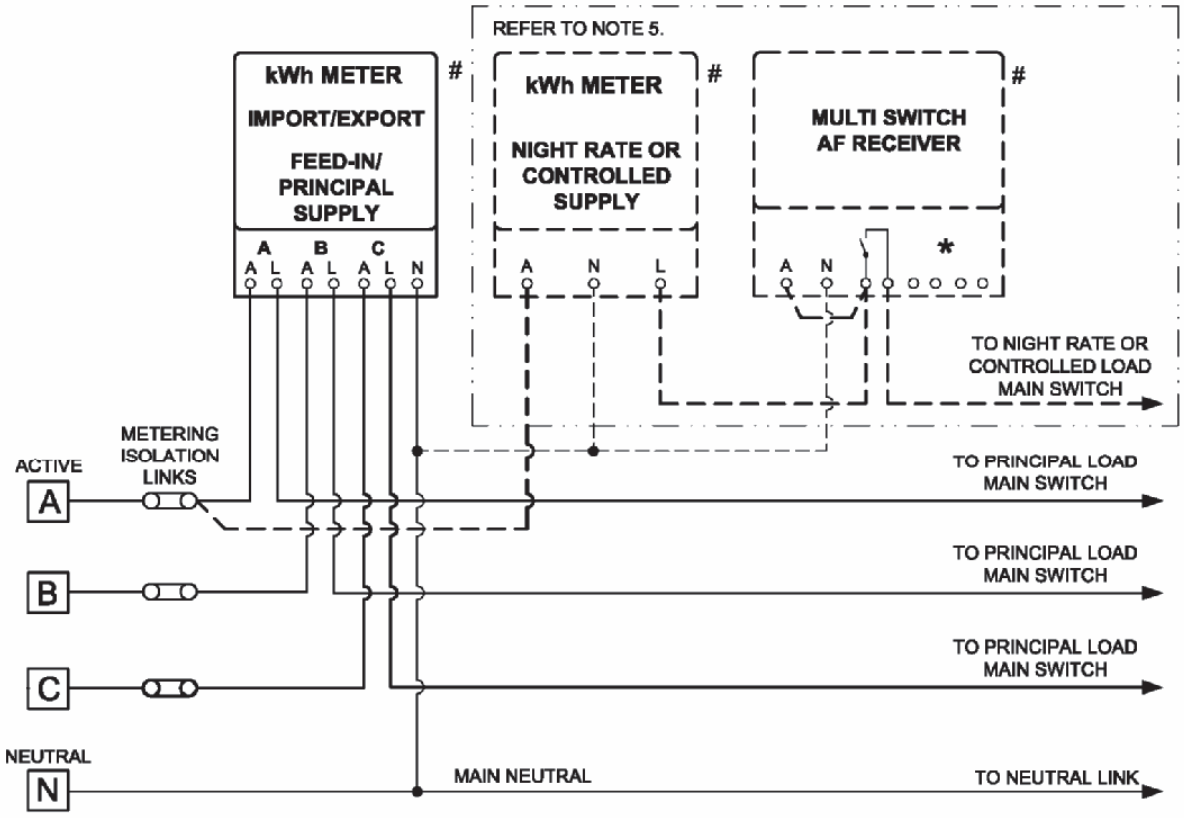
ENERGEX AND ERGON ENERGY

SINGLE OR THREE PHASE GRID CONNECTED INVERTER ENERGY SYSTEM IN A THREE PHASE SUPPLY/SERVICE WITH OPTIONAL LOAD CONTROL

NET ENERGY METERING SCHEME



ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:

1. INVERTER ENERGY SYSTEM (IES), COMPLIANT TO AS4777, CONNECTED WITHIN THE INSTALLATION ON THE CUSTOMERS SIDE OF THE PRINCIPAL LOAD MAIN SWITCH.
2. DOTTED LINES INDICATE VARIOUS SUPPLY OPTIONS.
3. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
4. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED.
5. METERS, METERING ISOLATION LINKS AND AF RECEIVER TO BE SEALED BY METERING PROVIDER.
6. IN ERGON ENERGY NON-RIPPLE CONTROL AREAS THE SINGLE ELEMENT kWh METER/AF RECEIVER COMBINATION TO BE REPLACED WITH A 2 ELEMENT METER. (SEE DRAWING ECMM 8.3)

Revision: B	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBUTOR'S NETWORK	ECMM - 10.5

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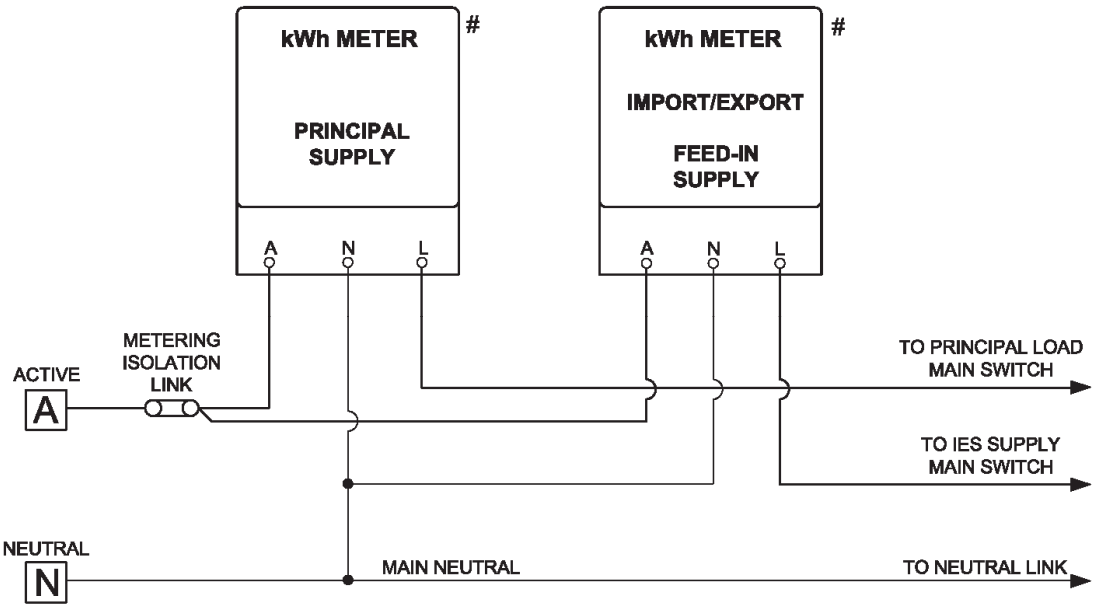
ENERGEX ONLY

SINGLE PHASE
GRID CONNECTED
INVERTER ENERGY SYSTEM
IN A SINGLE PHASE SUPPLY/SERVICE

GROSS ENERGY METERING SCHEME



ITEM SUPPLIED BY METERING PROVIDER.
● SOLDERED CONNECTION.

NOTES:
1. INVERTER ENERGY SYSTEM (IES), COMPLIANT TO AS4777, CONNECTED WITHIN THE INSTALLATION ON THE CUSTOMERS SIDE OF THE IES SUPPLY MAIN SWITCH.
2. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
3. METERS AND METERING ISOLATION LINK TO BE SEALED BY METERING PROVIDER.

Revision:	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBUTOR'S NETWORK	ECMM - 10.6
A		

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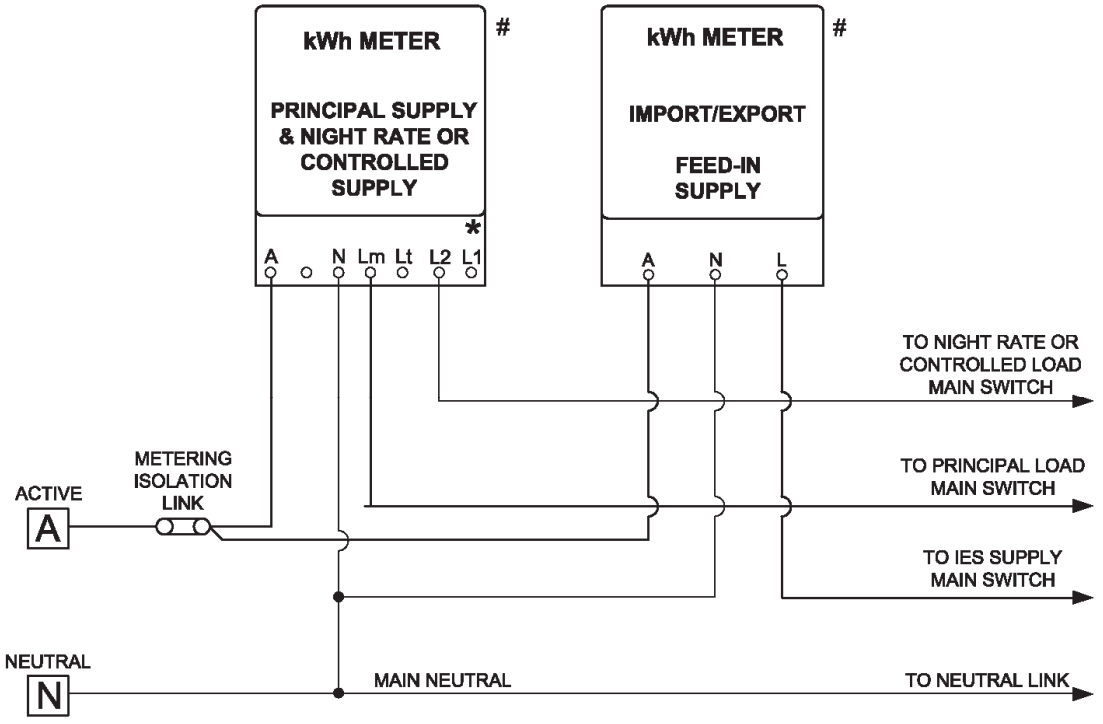
ENERGEX ONLY

SINGLE PHASE GRID CONNECTED INVERTER ENERGY SYSTEM IN A SINGLE PHASE SUPPLY/SERVICE WITH LOAD CONTROL

GROSS ENERGY METERING SCHEME



ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:

1. INVERTER ENERGY SYSTEM (IES), COMPLIANT TO AS4777, CONNECTED WITHIN THE INSTALLATION ON THE CUSTOMERS SIDE OF THE IES SUPPLY MAIN SWITCH.
2. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
3. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED.
4. METERS AND METERING ISOLATION LINK TO BE SEALED BY METERING PROVIDER.

Revision: A	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBUTOR'S NETWORK	ECMM - 10.7

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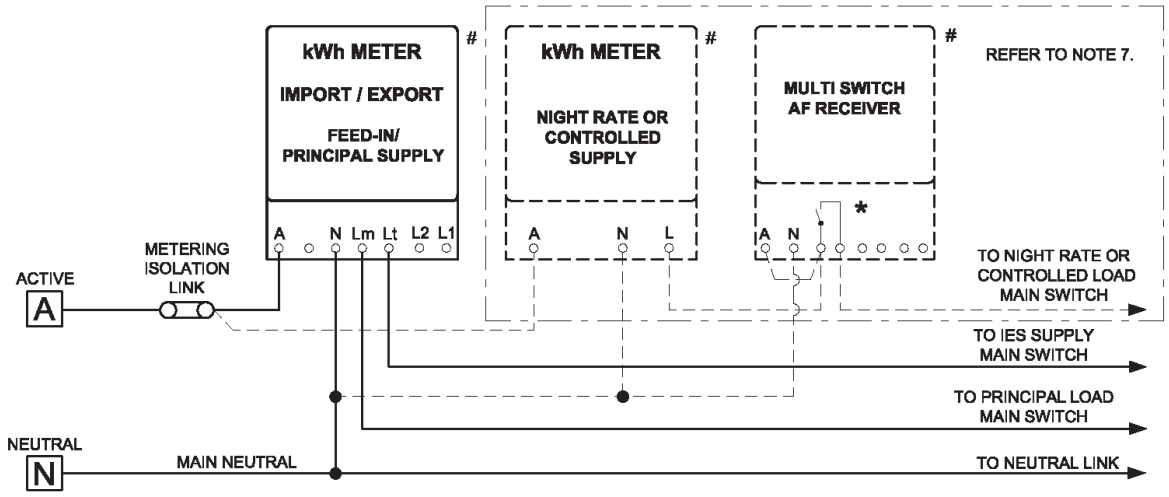
ERGON ENERGY ONLY

SINGLE PHASE
GRID CONNECTED
INVERTER ENERGY SYSTEM
IN A SINGLE PHASE SUPPLY/SERVICE
WITH OPTIONAL LOAD CONTROL

GROSS ENERGY METERING SCHEME



ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:

1. DOTTED LINES INDICATE VARIOUS SUPPLY OPTIONS.
2. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
3. WHERE RESISTIVE LOAD EXCEEDS 30A OR RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A. A CONTACTOR SHALL BE USED. SEE DRAWING ECMM 8.12
4. BI-DIRECTIONAL SINGLE PHASE ELECTRONIC METER REQUIRED FOR IMPORT / EXPORT ENERGY REGISTRATION.
5. INVERTER ENERGY SYSTEM (IES) COMPLIANT TO AS4777 CONNECTED WITHIN THE INSTALLATION ON THE CUSTOMERS SIDE OF THE IES SUPPLY MAIN SWITCH.
6. TWO ELEMENT METER TERMINAL DESCRIPTION.

1	A - ACTIVE IN
3	N - NEUTRAL IN
4	Lm - ELEMENT 1 (MAIN - PRIMARY LOAD)
5	Lt - ELEMENT 2 (UNSWITCHED - IES SUPPLY)
6, 7	L1 & L2 - NOT USED

7. IN NON RIPPLE CONTROL AREAS, THE SINGLE ELEMENT kWh METER / AF RECEIVER COMBINATION TO BE REPLACED WITH A 2 ELEMENT METER. SEE DRAWING ECMM 8.3.
8. METER, METERING ISOLATION LINK AND AF RECEIVER TO BE SEALED BY METERING PROVIDER.

Revision: A	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBUTOR'S NETWORK	ECMM - 10.8

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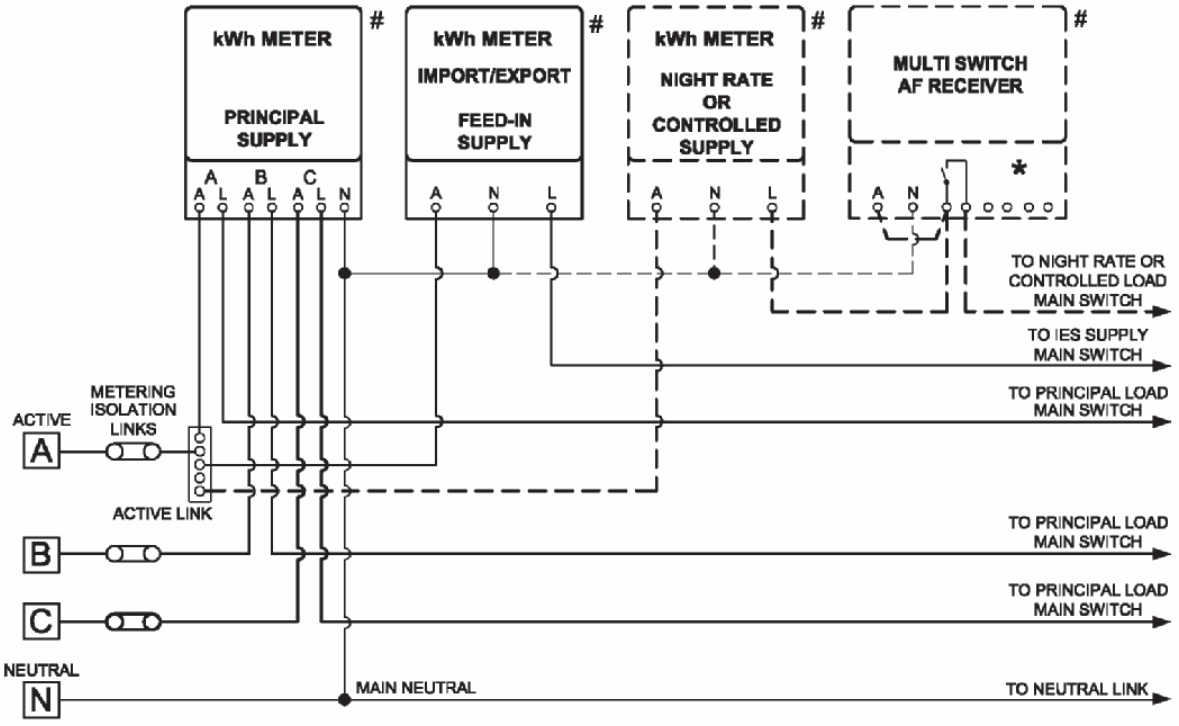
ENERGEX ONLY

SINGLE PHASE
GRID CONNECTED
INVERTER ENERGY SYSTEM
IN A THREE PHASE SUPPLY/SERVICE
WITH OPTIONAL LOAD CONTROL

GROSS ENERGY METERING SCHEME



ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION.

NOTES:

1. INVERTER ENERGY SYSTEM (IES), COMPLIANT TO AS4777, CONNECTED WITHIN THE INSTALLATION ON THE CUSTOMERS SIDE OF THE IES SUPPLY MAIN SWITCH.
2. DOTTED LINES INDICATE VARIOUS SUPPLY OPTIONS.
3. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
4. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED.
5. METERS, METERING ISOLATION LINKS, ACTIVE LINK AND AF RECEIVER TO BE SEALED BY METERING PROVIDER.

Revision: B	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBUTOR'S NETWORK	ECMM - 10.9

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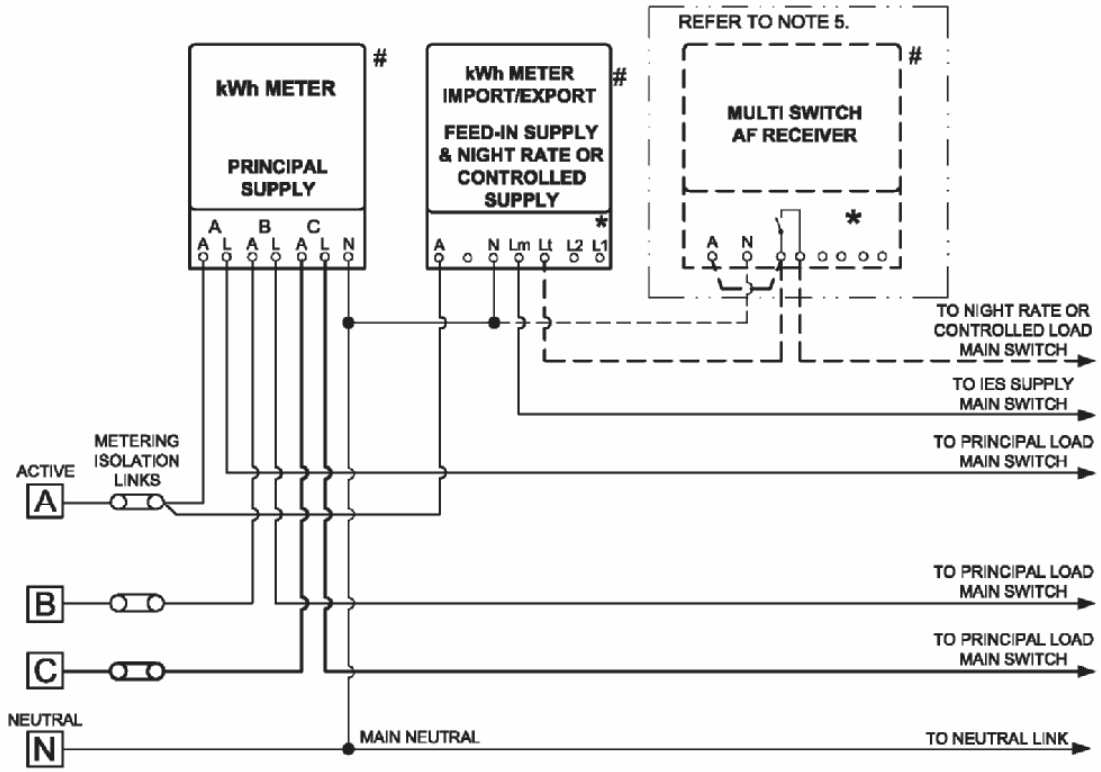
ERGON ENERGY ONLY

SINGLE PHASE
GRID CONNECTED
INVERTER ENERGY SYSTEM
IN A THREE PHASE SUPPLY/SERVICE
WITH OPTIONAL LOAD CONTROL

GROSS ENERGY METERING SCHEME



ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION

NOTES:

1. INVERTER ENERGY SYSTEM (IES), COMPLIANT TO AS4777, CONNECTED WITHIN THE INSTALLATION ON THE CUSTOMERS SIDE OF THE IES SUPPLY MAIN SWITCH.
2. DOTTED LINES INDICATE VARIOUS SUPPLY OPTIONS.
3. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
4. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED.
5. IN NON-RIPPLE CONTROL AREAS THE AF RECEIVER IS NOT USED AND THE NIGHT RATE OR CONTROLLED LOAD IS CONNECTED TO SWITCHED OUTPUT TERMINALS L1 OR L2 OF THE 2 ELEMENT METER.
6. METERS, METERING ISOLATION LINKS AND AF RECEIVER TO BE SEALED BY THE METERING PROVIDER.

Revision: B	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBUTOR'S NETWORK	ECMM - 10.10

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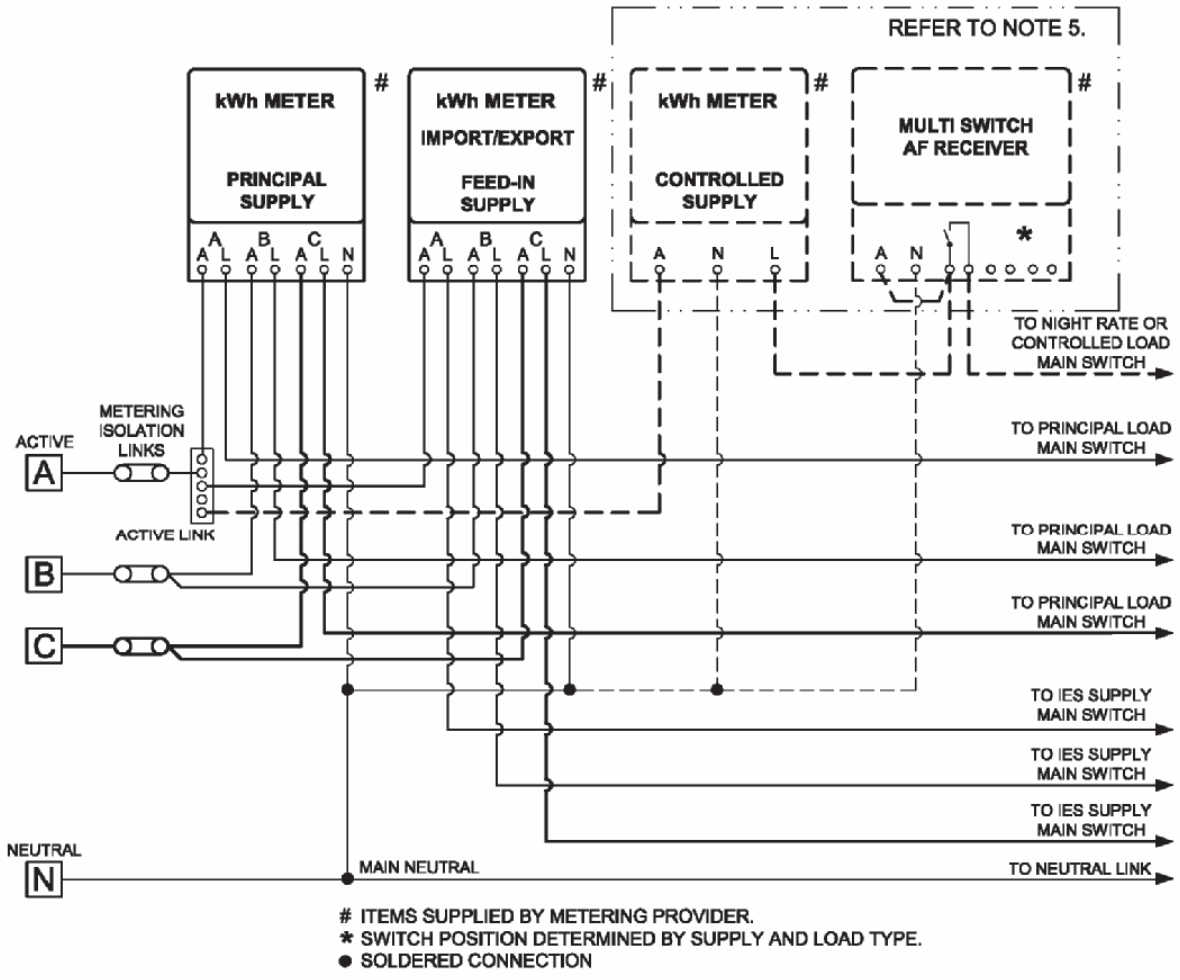
ENERGEX AND ERGON ENERGY

THREE PHASE GRID CONNECTED INVERTER ENERGY SYSTEM IN A THREE PHASE SUPPLY/SERVICE WITH OPTIONAL LOAD CONTROL

GROSS ENERGY METERING SCHEME



ITEMS SUPPLIED BY METERING PROVIDER.
* SWITCH POSITION DETERMINED BY SUPPLY AND LOAD TYPE.
● SOLDERED CONNECTION

NOTES:

1. INVERTER ENERGY SYSTEM (IES), COMPLIANT TO AS4777, CONNECTED WITHIN THE INSTALLATION ON THE CUSTOMERS SIDE OF THE IES SUPPLY MAIN SWITCH.
2. DOTTED LINES INDICATE VARIOUS SUPPLY OPTIONS.
3. ALL METER WIRING SHALL COMPLY WITH CLAUSES 7.14 AND 7.17.
4. WHERE RESISTIVE LOAD EXCEEDS 30A OR WHERE RESISTIVE AND INDUCTIVE LOAD EXCEEDS 20A, A CONTACTOR SHALL BE USED.
5. IN NON-RIPPLE CONTROL AREAS OF ERGON, THE SINGLE ELEMENT kWh METER/AF RECEIVER COMBINATION TO BE REPLACED WITH A 2-ELEMENT METER. SEE DRAWING ECMM 8.3.
6. METERS, METERING ISOLATION LINKS, ACTIVE LINK AND AF RECEIVER TO BE SEALED BY METERING PROVIDER.

Revision: B	METERING SCHEMES FOR INVERTER ENERGY SYSTEM (IES) CONNECTED TO DISTRIBUTOR'S NETWORK	ECMM - 10.11

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11. HIGH VOLTAGE METERING

11.1. General

The *customer* or *customer's* representative (*electrical contractor* or consultant) must contact the *distributor* prior to commencing any *high voltage metering*. *High voltage metering* is complex and the following may need to be considered:

(a) Specialised metering design (voltage change-over schemes etc.).

(b) Compliance with the *National Electricity Rules.*

(c) Equipment with long lead times (e.g. 6 to 12 months) may be required.

(d) Full or partial check metering requirements for large loads.

(e) Generator connections and import/export load flows.

(f) Test certificates for metering instrument transformers from an accredited laboratory.

The relevant metering requirements in previous chapters also apply to high voltage installations. Where there are differences between the information in Section 11 and the remainder of the *ECMM,* the requirements of Section 11 prevail in relation to *high voltage metering*. The additional details contained in Section 11 are specific to *high voltage metering* installations. The *distributor* or *metering provider* can be contacted for additional information.

11.2. Establishing a Network Connection and *NMI*

For high voltage connections the process of metering the site, data collection and settlement of energy requires the following steps:

1. The *customer* is required to engage an electricity *retailer* licensed to operate in Queensland.
2. The *retailer* is required to nominate the metering data provider and *responsible person* for each network connection.
3. The *responsible person* is required to nominate the *metering provider*.
4. The *retailer* is required to submit a *SOR* to the *distributor* to make the network connection.

The above process will establish a *NMI* per *point of supply* in line with the *distributor's* policies and the *AEMO* "National Metering Identifier Procedure".

11.3. Offer of Supply Letter and/or Network Connection Agreement

The *distributor* will negotiate a connection agreement detailing the conditions for the high voltage supply. This correspondence will include network requirements and the responsibility for providing the *high voltage metering*.

11.4. *Point of Supply*

Refer to Clause 5.2.2 for *point of supply* arrangements.

The revenue metering point shall be located as close as practicable to the *point of supply*.

11.5. Revenue Metering

The arrangement for the *high voltage* revenue metering will be determined during the negotiation of the connection agreement and may be one of the following:

(a) The standard *high voltage metering* arrangement is a metering unit owned, installed and maintained by the *distributor*. The metering unit is part of the connection assets. The

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metering unit contains the metering current transformers and voltage transformers (revenue metering instrument transformers). Details of the metering unit may be obtained from the *distributor*.

(b) *Distributor* owned metering units mounted on the *distributor's* pole will be installed and maintained by the *distributor*. Any associated costs will be detailed in the supply agreement. Metering units are the preferred arrangement for *high voltage metering* at voltages up to 33kV.

(c) An alternative arrangement is where the *customer* is responsible for supplying, installing and maintaining the metering instrument transformers within their own switchgear. This equipment shall comply with the requirements of Schedule 1 of the *AEMO* Metrology Procedure Part A and be approved by the *distributor*.

(d) Where the supply voltage exceeds 33kV the position of the revenue metering instrument transformers could vary depending on the position of switchgear in relation to the load and supply arrangements. The position of the revenue metering instrument transformers will be determined during the negotiation of the connection agreement.

11.6. *Customer* Owned Revenue Metering Instrument Transformers.

(a) The *customer* shall provide revenue metering instrument transformers, associated equipment and plant that is integral with the installation's switchgear. The equipment must be ready for a *metering provider* to connect metering and communication equipment.

(b) Revenue metering instrument transformers will remain the *customer's* property, and the *customer* will be responsible for maintaining, servicing and if failure occurs, replacing the metering instrument transformers in accordance with the requirements of the *National Electricity Rules*.

Note: Any fault is required to be rectified within 2 days or the *responsible person* must obtain an exemption from the *AEMO*.

(c) The revenue metering instrument transformers are to be specified, installed, tested and maintained in accordance with the *National Electricity Rules*, relevant Australian Standards (AS/NZS 3000 (Wiring Rules), AS 2067, AS 1243, AS 60044 series) and the requirements of the *ECMM*.

(d) Instrument Transformer test certificates in accordance with the *National Electricity Rules* Schedules 7.2 and 7.3 are to be provided to the *metering provider* prior to installation of the equipment.

(i) Where revenue metering instrument transformers are tested in Australia, endorsed reports from a laboratory accredited by *NATA* are required; or

(ii) Where revenue metering instrument transformers are tested overseas, endorsed reports from a laboratory accredited by an organisation recognised by ILAC (International Laboratory Accreditation Cooperation) are required.

(e) Metering system designs that are approved by a *metering provider* or *responsible person* shall also be endorsed by the *metering provider* and *distributor* prior to connection.

The *customer* shall supply a single line diagram, HV switchboard layout, and a schematic diagram showing the wiring details from the instrument transformers (current and voltage transformers) to the metering panel.

(f) The *customer* is required to supply, install and test the secondary wiring and meter enclosure/panel and terminate the secondary wiring at the meter panel and the metering instrument transformers.

(g) The *customer* is responsible for ensuring that all requirements and steps in the metering installation process are coordinated in an efficient and timely manner to allow supply to be connected when required.

(h) The *customer* shall provide readily accessible high voltage test points on either side of the metering instrument transformers, in the specification/design of their switchgear. This will enable the *metering provider* to conduct the periodic *high voltage metering* instrument transformer accuracy tests (e.g. primary injection tests), required by the *National Electricity Rules*, with minimal power outages and disruption to the *customer* and their equipment.

(i) Revenue metering current transformers cannot be used for any other purpose. If current transformers are required to supply *customers* equipment they must be separate to, and shall be positioned on the load side, of the revenue metering current transformers in the high voltage circuit.

(j) The metering voltage instrument transformers may be used to supply *customers* metering at the discretion and approval of the *metering provider* on a case by case basis. The secondary voltage supply from the voltage transformers will be separately fused with fuses located in an accessible position as near as practicable to the voltage transformer secondary connection. The revenue metering instrument transformers' secondary wiring is to be earthed at one point only in accordance with the *metering provider*'s requirements.

(k) The minimum spacing between the meter wiring and other current carrying conductors shall comply with TABLE 9.3.

(l) Adequate and safe access must be provided for the installation, routine and corrective maintenance of revenue metering equipment in accordance with *AEMO* requirements.

11.7. Meter Enclosure

The following requirements apply to *high voltage metering* enclosures:

(a) Unless otherwise detailed in the supply agreement the *customer* must supply a pre-wired meter panel and enclosure to the requirements of the *metering provider*. Wiring diagrams can be obtained from the *metering provider*.

(b) Any metering enclosure mounted externally must have an appropriate IP rating and be positioned so that adequate mechanical protection is provided.

(c) A hinged panel with minimum dimensions of 600mm x 600mm is required for the mounting of meters and metering test block on the same vertical surface.

(d) A metering enclosure installed on a pole in association with a *distributor* owned metering unit, will be supplied and maintained by the *distributor*.

(e) No *customer* owned equipment is to be installed within the *metering provider's* dedicated metering enclosure.

(f) The supply and wiring of the meter panel may be carried out by the *metering provider* as part of a negotiated agreement.

(g) The *customer* is responsible for earthing of the metering enclosure.

(h) The *customer* should consider providing lockable front meter doors in locations where security may be an issue.

11.8. Secondary Wiring

The following requirements apply to metering units supplied by the *metering provider* and revenue metering instrument transformers owned and installed by the *customer*.

(a) The *customer* shall supply and install the secondary wiring between the revenue metering instrument transformers and the test block or terminal strip.

(b) Revenue metering instrument transformer secondary wiring is to follow the most direct route and the number of terminations and links must be kept to a minimum.

(c) Revenue metering instrument transformer secondary wiring is to be PVC insulated stranded cable of no more than 7 strands.

(d) The secondary wiring shall be sized to ensure that the burden on the revenue metering instrument transformers is not exceeded.

(e) All taps of multi-tap CTs to be brought out to the marshalling box or metering enclosure (in the absence of a marshalling box).

(f) Any connection point in the revenue metering instrument transformers' secondary circuit (terminals, links, fuses etc.) that is accessible must be identified as "Revenue Metering" and must be able to be covered and sealed.

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APPENDIX A - SPECIFICATION FOR METALLIC ENCLOSURES FOR METERS IN DOMESTIC INSTALLATIONS

Foreword

This specification provides for metallic enclosures only. The use of other materials, such as fibreglass or plastic is subject to the approval of the *metering provider*. In such cases, the general requirements of this specification may provide guidance.

A.1 Scope and General

A.1.1 Scope

This specification provides standard requirements for metallic enclosures for revenue meters and control equipment used in domestic installations.

A.1.2 Definitions

A.1.2.1 *Approved* - means approved by the *metering provider*.

A.1.2.2 *Domestic Installation* - means an installation in a private dwelling or that portion of an installation associated solely with an individual flat or living unit.

A.1.2.3 *Meter Enclosure* - means an enclosure used for the purpose of housing revenue metering equipment.

A.1.2.4 *Meter Panel* - means a panel to be mounted in the meter enclosure and on which metering equipment is fixed.

A.1.2.5 *Metering Equipment* - means the equipment used for measuring or controlling the supply of electrical energy.

A.1.2.6 *Weatherproof* - means so constructed and installed as to exclude rain, hail and external splashing so that the safe and efficient operation of the equipment contained therein shall not be impaired. (e.g. IPX3).

A.2 Design and Construction

A.2.1 Materials

The meter enclosure may be constructed from the following:

MATERIAL	MAXIMUM THICKNESS (mm)
Mild Steel	Enclosure Type A 1.0 Enclosure Type B 1.2
Aluminium	To be equivalent in strength and rigidity to the above mild steel requirements
Other Materials	To be approved

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A.2.2 Construction

A.2.2.1 The enclosure should be constructed free of burrs at the opening.

A.2.2.2 The enclosure, if of steel construction, should be of galvanised or zincalume material and shall comply with the requirements of AS 1397 “Steel sheet and strip - hot dip zinc-coated or aluminium/zinc-coated”.

A galvanised steel meter enclosure shall have all galvanised surfaces repaired with a suitable zinc rich coating. All exterior surfaces of the enclosure should be painted with one coat of “etch primer”.

A.2.2.3 The use of aluminium shall be restricted to corrosion resistant alloys as recommended for the exposure to be encountered in service (stainless steel is an acceptable alternative).

A.2.2.4 Rivets shall be of a material that is compatible with the case material and must not react to set up points of corrosion.

A.2.2.5 Where additional mechanical strength is required stiffening ribs may be utilised. Such ribs must not in any way reduce the minimum internal dimensions.

A.2.3 Door

A.2.3.1 The meter enclosure is to be fitted with a hinged door of sufficient strength to prevent buckling or warping.

A.2.3.2 The door shall be side hinged, unless otherwise approved by the *metering provider*, and fitted with a suitable non-corroding chain or other approved means to limit the door travel to approximately 100 degrees. The door may be hinged at either the left or right side of the meter enclosure and shall be fitted with a simple self-latching device.

A.2.3.3 Hinges provided shall be of non-corroding material and so designed or fitted with non-corroding pins as to prevent seizing.

A.2.4 Door Latch

The latching device provided shall engage automatically and hold the door firmly closed.

A.2.5 Entry of Wiring

Adequate provisions shall be made for knockouts or slots for the entry of wiring to the meter enclosure. (Refer to AS/NZS 3000 (Wiring Rules) for fire protection requirements).

Entries may be provided in the top of the enclosure but in this case the final assembly should withstand the test in Appendix A Clause 2.7.

A.2.6 Earthing

An earthing stud or terminal complying with the requirements of AS/NZS 3000 (Wiring Rules) shall be provided for the connection of an earthing conductor within the enclosure. The stud or terminal shall not obstruct equipment within the enclosure.

A.2.7 Weatherproofing

The enclosure is to comply with AS/NZS 60529 "Degrees of Protection Provided by Enclosures" to a minimum of IPX3.

The enclosure shall provide adequate ventilation to minimise condensation and be capable of draining any moisture that may collect within the enclosure.

A.2.8 Meter Panel

A.2.8.1 Meter panels shall be made of durable, non-conducting, fire resistant material with low water absorption properties.

A.2.8.2 The meter panel shall be side hinged on a vertical axis so that the metering equipment always remains in the vertical plane.

A.2.8.3 Panel hinges should be of the double off-set type that allows for the panel to be swung into the fully opened position and shall be of adequate strength to support the meter panel, and associated metering equipment.

The hinges shall be constructed of a suitable non-corroding material. When the meter panel is opened at an angle of 90 degrees, the design of the enclosure and hinges should be such to withstand without undue distortion a weight of 25kg suspended vertically at a position 25mm from the outer edge of the panel.

A.2.8.4 Where the switchboard is remote from the meter enclosure, metering equipment may be installed in the switchboard section of the meter enclosure.

A.3 Dimensions

A.3.1 General

Two basic types of meter enclosures are provided for, the dimensions of which are to be suitable for recessing into brick, block or framed walls. Other meter enclosures of adequate size to house the meters with recommended clearances and suitable construction may be used.

Metal Enclosure	Minimum Thickness Mild Steel	Minimum Space Required For Metering Equipment	Clearance From Back of Meter Panel to Back of Enclosure	Clearance From Back of Meter Panel to Inside of Door
Type A	1.0mm	480mm x 460mm (high) (wide)	75mm	185mm
Type B	1.2mm	600mm x 550mm (high) (wide)		

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APPENDIX B - GLOSSARY OF TERMS

Accredited Auditor

A person appointed under section 129 of the *Electrical Safety Act 2002* to audit high voltage or hazardous area installations before connection to supply.

Further information may be obtained from the Electrical Safety Office.

AEMO

'Australian Energy Market Operator' is responsible for the day to day management of wholesale and retail energy market operations and emergency management protocols; on-going market development required to incorporate new rules, infrastructure and participants; and long term market planning through demand forecasting data and scenario analysis.

AF Receiver

Audio Frequency Receiver - a switching device used to control loads via transmitted signals in the range of 167 - 1050Hz over the Distribution Network.

Note: These devices are also referred to as ripple control *AF receivers*.

Approved Form

For the purposes of this document the term '*approved form*' means:
(i) ENERGEX - *Electrical Work Request (*Form 2)*; or*
(ii) Ergon Energy Form A - *Request for Initial Connection, Metering Change or Service Alteration*

Card Operated Meter

A meter that contains control equipment that switches on and off in accordance with the amount of credit stored in the meter.

Common Property

Common property means so much of a parcel as from time to time is not comprised in any lot. *Building Units and Group Titles Act 1980*

Consumer's mains

The conductors between the *point of supply* and the main switchboard.

Controlled Load

Controlled Supply

Those loads that are wired separately from other appliances, are controlled by means of frequency injection receiver or time clock, and are separately metered from the remaining load at the metering point.

Current Transformer Metering

A metering arrangement where electricity flow is measured by a meter using current transformers (CTs).

Customer

A person, including a relevant body corporate, who receives, or wants to receive, a supply of electricity for a *premises* from an electricity entity or special approval holder.
Refer to section 23 of the *Queensland Electricity Act 1994* for details of 'large' and 'small' *customers*.

Direct Connected Meter

A meter where the electricity flow is directly measured by the meter i.e. the current under measurement passes through the meter itself.

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Distribution Entity **'Distributor'**	A distribution entity is a person who holds a distribution authority that authorises its holder to supply electricity using a supply network within its distribution area. See sections 37, 38 and 39 of the *Queensland Electricity Act 1994.* (Refer to definition for Relevant Distribution Entity).
ECMM	Queensland Electricity Connection and Metering Manual
Electrical Contractor 'EC'	A person licensed under the *Electrical Safety Act 2002* to conduct a business or undertaking that includes the performance of electrical work.
ENERGEX	ENERGEX Limited - ABN 40 078 849 055
Enhanced Metering	A scheme, which is not normally considered to be part of standard metering as described in this manual (e.g. has pulse inputs, outputs, or remote communications). Additions that are above and beyond the metering provided in this manual.
Ergon Energy	Ergon Energy Corporation Limited ABN 50 087 646 062
Excluded Customer	A *customer* who cannot choose their *retailer*. For example, *customers* connected to isolated power systems.
High Voltage Metering	A high voltage metering arrangement where electricity flow is measured by a meter using current transformers and voltage transformers.
IES	A grid connected inverter energy system as defined in AS 4777.
IES Gross Energy Scheme	The *Gross Energy Scheme* separately meters the full energy output of the *IES*. The energy consumed at the *premises* is metered normally.
IES Net Energy Scheme	The *Net Energy Scheme* provides for the separate measurement of the energy supplied from the LV network to the *customer's* installation in excess of the *IES* generation, and the excess energy supplied to the LV network from the *premises* by the *IES* after the energy needs at the *premises* are met.
Integrated Meter	A single phase two element device which includes both metering and load switching within one meter.
Isolated Power System	A supply network that does not form part of and is not connected to the national grid and may include an isolated feeder.
Large Customer	A *customer* whose annual consumption is equal to, or greater than, 100MWh, and is connected to the distributor's network.
Large Non-market Customer	A *large non-market customer*, for *premises*, is a *large customer* for the *premises* who is also a non-market customer for the *premises*.

Market Customer	A *customer* is a *market customer* for a *premises* if - (a) the *customer* is a party to a negotiated retail contract for the *premises*; or (b) the *customer* is, for the *premises*, registered under the *National Electricity Rules* as a market participant under the category market *customer* for the *premises*; (c) the *customer* is the State or a local government and the *premises* are street lighting located in the distribution area of *ENERGEX* Limited ACN 078 849 055. Or in accordance with sections 30U to 30Z of the Queensland *Electricity Regulation 2006*.
Metering Data Agent	An agent appointed by *AEMO* to undertake the collection, processing and transfer of metering data to *AEMO* and other registered participants.
Metering Data Provider	A service provider accredited by *AEMO* to undertake the collection, processing and transfer of metering data to *AEMO* and other registered participants.
Metering Provider 'MP'	A person who meets the requirements listed in Schedule 7.4 of the *National Electricity Rules* and is registered with the *AEMO*. **Note:** The *distributor* is the *metering provider* for *non-market customers*, *small customers* and for *large customers* when nominated by the *retailer*.
NATA	The National Association of Testing Authorities.
National Electricity Rules	The rules under which the National Electricity Market operates.
National Metering Identifier 'NMI'	A *National Metering Identifier* (*NMI*) is a unique national identifier that relates to the metering installation at a customer's *premises.*
NMI Classification	Small - annual consumption less than 100MWh Large - annual consumption equal to, or greater than 100MWh.
Point of Attachment	The point at which aerial conductors of a *service line* or aerial *consumer's mains* are terminated on a *customer's* structure.
Point of Entry	The point at which the *consumer's mains* or the underground service cable enters a structure.

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Point of Supply, **Consumer's Terminals** **Connection Point**	The junction of the point where a *customer's* electrical installation is connected to an electricity distribution system. **Note (1):** Previous editions of AS/NZS 3000 referred to the '*Point of Supply*' as the '*consumer's terminals*'. **Note (2):** The *Queensland Electricity Regulation 2006* uses the definition '*consumer's terminals'*. **Note (3):** The *National Electricity Rules* uses the definition '*connection point'*.
Premises	*Premises* includes - (a) a building or other structure; and (b) a part of a building or other structure; and (c) land where a building or other structure is situated. *Premises*, of a *customer*, means *premises* owned or occupied by the *customer*. *Queensland Electricity Act 1994*
RPEQ	Registered Professional Engineer Queensland.
Relevant Distribution Entity **'Distributor'**	The *relevant distribution entity* for a *premises*, means the *distribution entity* to whose supply network the *premises* are, or will be, connected. **Note:** For the purposes of this document the relevant *distribution entity* will be referred to as the '*distributor*'.
Relevant Retail Entity **'Retailer'**	The *relevant retail entity* for a *premises*, means the retail entity who, under a retail contract, supplies or has agreed to supply electricity to the *premises*. **Note:** For the purposes of this document the *relevant retail entity* will be referred to as the '*retailer*'.
Responsible Person	The person responsible for the provision, installation and maintenance of a metering installation in accordance with Chapter 7 of the *National Electricity Rules* and the National Metrology procedure.
Retail Entity	A person who holds a retail authority to sell electricity and retail services (a 'retail authority' authorises its holder to provide *customer* retail services under the terms of the authority).
Rural/Isolated Area	A *rural/Isolated area* is defined as one with a density of less than 5 lots per hectare (i.e. would generally have a dedicated transformer). **Note:** This definition is only applicable within the *Ergon Energy* distribution area.

Service Line	An electric line that- (a) forms part of the works of an electricity entity; and (b) connects *consumer terminals* to - (i) other parts of the works of the electricity entity; or (ii) the works of another electricity entity. Schedule 9 of the *Queensland Electricity Regulation 2006*.
Small Customer	A *customer* who consumes less than 100MWh per annum and is connected to the distributor's network.
Small Non-market Customer	If a small *customer* enters into a standard retail contract for a *premises*, or is, under section 51(2) of the *Queensland Electricity Act 1994*, taken to have entered into a standard retail contract for a *premises*, the *customer* is not a market *customer* for the *premises*.
SOR	Service Order Request - This is a request from a *Retailer* to a *Distributor* to perform a distribution service (e.g. New Connections, Metering Alterations and Service Upgrades). It is also referred to as a B2B request.
Suitable Mains Connection Box	A mains connection box that is deemed to be compliant with the *distributor's* technical specifications. Details are available by contacting the *distributor* via the methods listed on page 1
Unmetered Supply	A Type 7 metering installation classification (*NER*) where a metering installation does not require a meter to measure the flow of electricity in a power conductor and accordingly there is a requirement to determine by other means the energy data that is deemed to flow in the power conductor.
Urban	A residential area with a system of street lighting.

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APPENDIX C - AMENDMENT RECORD

Please note: It is not possible to cover all of the changes in the following list and table of changes, nor can the changes be covered in the detail and context as they appear within the manual. As a Registered *Electrical Contractor* it is the responsibility of you and your endorsees to be fully conversant with the content and requirements of the Electricity Connection and Metering Manual.

Date 30/6/11 Previous Version 5

Chapter 2	
Clause 2.8	Note removed and inserted under Notes as point 2
Clause 2.13.1	Identification requirements of generator neutral added
Clause 2.13.2 (b)	Removed reference to clause 9.2.1(c)
Chapter 4	
Clause 4.2.3 (b)	Changed schedule to gazette
Chapter 5	
Clause 5.4 (e)	Changed to allow open eye screw
Clause 5.4.4 note 2	Changed hook with retaining device to pigtail
Clause 5.4.4 Note 3	Removed hardwood or equivalent
Clause 5.4.4 note 5	Changed % to degrees
Clause 5.4.6 (e)	Changed mains box requirements
Clause 5.5.3	Note changed
Clause 5.10.2	Removed requirement for bus tie to be on line side of metering
Drawing ECMM 5.7	New version
Drawing ECMM 5.8	New version
Drawing ECMM 5.9	New version
Drawing ECMM 5.10	New version
Chapter 6	
Clause 6.3.1	Amended requirements for card operated meters
Drawing ECMM 6.5	New version
Chapter 7	
Clause 7.1	Removed requirement for customer CT's to be on load side of metering in multiple tenancy installations
Clause 7.2.2	Changed requirements for main switches at multi tenancy installations
Clause 7.2.3 Exception 1	Changed requirements for IES meters
Clause 7.2.3 Exception 3	Requirements changed for plug in metering at IES installations
Clause 7.2.3 Note 2	Wording change to sticker on MIL
Clause 7.5.4	Removed allowance for top hinged meter panels
Clause 7.6.1	Reworded for clarity
Clause 7.6.3	Reworded for clarity
Clause 7.8.5 (a) Note	Reworded for clarity
Clause 7.8.5 (b) Note	Reworded for clarity
Clause 7.13	Reworded to allow 3 phase installations to have links side by side
Clause 7.15	Allowance for surface wired MIL in Energex
Clause 7.16 Note	Allowance to loop out of line side of MIL
Clause 7.17	Reworded for clarity and added allowance for 10mm^2 flex
Drawing ECMM 7.8	New version

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Chapter 8

Clause 8.1	Requirement for pool pumps on controlled tariff added
Clause 8.3	Removed allowance for use of additional switch in receiver for Ergon Energy area
Drawing ECMM 8.3	New version
Drawing ECMM 8.4	New version
Drawing ECMM 8.5	New version
Drawing ECMM 8.6	New version
Drawing ECMM 8.7	New version
Drawing ECMM 8.8	New version
Drawing ECMM 8.10	New version
Drawing ECMM 8.11	New version
Drawing ECMM 8.12	New version
Drawing ECMM 8.13	New version
Drawing ECMM 8.14	New version

Chapter 9

Clause 9.2	Removed Exception
Table 9.1	Changed CT Class
Clause 9.6.4	Removed requirement for handles only on metal covers
Clause 9.9 Exception (b)	Reworded for clarity
Clause 9.14.5	Reworded for clarity
Drawing ECMM 9.1-1	New version
Drawing ECMM 9.2	New version
Drawing ECMM 9.3	New version
Drawing ECMM 9.6	New version
Drawing ECMM 9.7	New version
Drawing ECMM 9.8	New version

Chapter 10

Drawing ECMM 10.1-1	New drawing
Drawing ECMM 10.4	New version
Drawing ECMM 10.5	New version
Drawing ECMM 10.9	New version
Drawing ECMM 10.10	New version
Drawing ECMM 10.11	New version

Appendix A

A 2.3.3	Removed allowance for top hinged meter box

Appendix B

Inserted definition of S*uitable Mains Connection Box*

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NOTES

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