

Metering and Installation Rules of New South Wales

December 2023

Foreword

The Metering and Installation Rules of New South Wales (MIRs) is the industry code outlining the requirements for the installation of metering equipment at a customer's premises in New South Wales. The Department of Customer Services (DCS) prepares these MIRs with the assistance of the MIRs committee (the Committee) and is the notional holder of the copyright of these MIRs.

These MIRs set out the minimum standards for providing safe, reliable, and efficient metering installation services to customer premises. These MIRs should also be read in conjunction with Chapter 7 of the National Electricity Rules.

Neither the Committee nor DCS accepts any responsibility for:

- the design, operation or failure of any electrical installation or installation work; or
- any loss or damage occasioned to any person or property as a result of carrying out metering services.

Compliance with these MIRs does not necessarily ensure satisfactory operation of electrical installation or installation work. The person undertaking the work is responsible for carrying out any additional work to ensure satisfactory operation.

DCS is responsible for resolving issues, monitoring the impact and further development of these MIRs. Further amendments will be considered as the need arises.

There may be situations these MIRs does not cover. These may include unusual connection, metering arrangements or situations that have been inadvertently omitted, and alterations to legislation and codes. DCS and the Committee does not accept responsibility where these situations occur.

The requirements of these MIRs may be applied to installations from the date of publication but will become mandatory for all new work from 1 April 2024.

Comments or enquiries on the provisions of these MIRs should be directed to Building Commission NSW.

Acknowledgements

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1 GENERAL REQUIREMENTS

1.1 Purpose and Application of these Rules

These Metering and Installation Rules (MIRs) set out the obligations in respect of metering that were previously stipulated by electricity distributors. These obligations now fall on the Metering Coordinator (MC), Metering Provider (MP), metering equipment installers working on behalf of the MP and electrical contractors when preparing an electrical installation for metering. These requirements are important for the safe installation of metering equipment and are required for on-going safety and technical needs of all parties.

New or replacement metering installations are now part of the consumer's electrical installation and fall under the provisions of these rules. This includes parent and child metering of embedded networks, on-market and off-market metering of embedded networks and small generator aggregator (SGA) metering.

Where the word “shall” appears, it indicates that the requirement is mandatory and alteration to the requirement is not permitted.

Where other less definitive terminology is used, a degree of flexibility is indicated. It may be feasible for the MC, MP or meter equipment installer to negotiate with Building Commission NSW.

These MIRs are designed to achieve safe, reliable, and efficient outcomes for the MC, MP, meter installer and the customer.

Consideration of safety to customers, workers and the general public is paramount - as well as consideration of potential liability.

Should a contravention of these MIRs (without an accepted alternative method) occur, Building Commission NSW requires correction of the contravention subject to any resolution achieved by a dispute resolution process. Non-correction may lead to further action taken by Building Commission NSW against the person who undertook the non-compliant work as allowed under the *Gas and Electricity (Consumer Safety) Act 2017* and supporting Regulation and the *Home Building Act 1989* and supporting Regulation.

For avoidance of doubt, nothing in these MIRs is intended to prevent or impede an electricity distributor exercising their rights under legislation in the management of their distribution system and equipment.

Note: All equipment on a switchboard, except for distributor metering and load control equipment, is a part of the customer's' electrical installation. The customer is responsible for maintaining all parts of their electrical installation. These MIRs have been amended to reflect this requirement.

1.2 Advice to contractors

The customer's electricity retailer nominates the MC for the installation, who will appoint an accredited MP to install and maintain the metering installation. The space requirement for metering equipment on the customer's premises will be as specified in these MIRs. Charges may apply for metering equipment, as determined by the customer's retailer.

The customer/contractor is required to initiate and make arrangements for metering equipment, including the location of metering equipment as determined by these MIRs and the MP.

1.3 Safety and Environmental Risk Management

These MIRs specify the technical requirements for metering work associated with electrical installations. MP and metering equipment installers working on behalf of a MP who are trained and qualified to carry out this work shall do so in accordance with the conditions of their electrical contractor's licence, electrical supervisor's certificate (licence) and authorisations as applicable. They shall abide by all applicable safety and environmental legislative requirements. This includes a requirement to assess the safety and environmental risks associated with the carrying out of the work and taking appropriate action to mitigate those risks. The general process is summarised as follows:

- (a) Identify the hazards associated with the work and the worksite.
- (b) Assess the risks associated with the identified hazards.
- (c) Implement appropriate control measures to mitigate the hazards.

An example of this process is the use of a Hazard Assessment Checklist (HAC) at the work site prior to commencing work. The HAC includes a check of tools, equipment, worksite safety and environmental hazards.

Refer to AS/NZS 4836 'Safe working on or near low-voltage and extra-low voltage electrical installations and equipment' as a guide.

1.4 Alterations, Additions and Upgrades

These MIRs, in their entirety and the Service and Installation Rules provide the guidelines for all new electrical installations.

However, alterations, additions, or upgrading of existing electrical installation and/or metering equipment required by or for the customer shall comply with these MIRs and AS/NZS 3000.

In regard to the metering equipment, the replacement of an existing type 5 or type 6 meter with a type 4 or type 4A meter is considered an alteration.

All alterations, additions and upgrades shall:

- ensure the Multiple Earthed Neutral (MEN) connection is at the customer's main neutral bar (link) and not at a Supply Neutral Bar (Link) or Meter Neutral Bar (Link), and
- ensure the Meter Protection Device (MPD) meets with the requirements of a High Rupturing Capacity (HRC) fuse as per clause 2.8 of these MIRs.

Type 5 or type 6 metering equipment shall not be removed from an existing meter/switchboard panel and reinstated on a new meter/switchboard panel. The metering equipment shall be replaced with a type 4 or, where approved, type 4A meter.

1.5 Embedded Network Meters

In accordance with the requirement of the National Electricity Rules all new or replacement meters installed for all individual small customer installations within an embedded network shall be an advanced type meter installation. This includes both on-market and off-market meters.

The installation of child metering equipment, both on-market and off-market, within an embedded network shall meet with the requirements of these MIRs and the National Electricity Rules.

Prior to energising, all individually metered installations within an embedded network shall be provided with an individual National Meter Identifier (NMI) number.

1.6 Alternative Methods

Where the customer, MC, MP or metering equipment installer proposes an alternative method that is not specifically contained in these MIRs, the proposal shall deliver the same or better level of safety, reliability and efficiency.

Applications for alternative methods shall be approved by the NSW Building Commission in discussion with the MC, where appropriate, and comply with Chapter 7 of the National Electricity Rules.

1.7 Communications

The customer's electricity retailer may require the customer to provide for the installation of communication equipment for remote data acquisition and/or operation of meter.

Type 4 meters by default and definition, operate with remote data acquisition, and are typically interrogated on a daily basis.

For a new multiple occupancy building, where the metering equipment may be installed in a location which has little or no public telecommunication network signal, e.g., basement area of building or low signal areas, provision for additional communication infrastructure to support remote data acquisition and/or operation of the meter will need to be provided. The MC shall be consulted to provide information of additional requirements.

In regional areas where little or no public telecommunication network signal exists additional communication equipment or other requirements may be necessary. The MC shall be consulted to provide information of additional requirements.

An aerial shall not be installed in a location which:

- (a) Prevents the opening of a switchboard/metering panel, or
 - (b) hinders access to equipment for its safe operation and maintenance, or
 - (c) hinders the opening and/or removal of a switchboard enclosure door.
-

1.8 Authorisation

Prior to the installation of meters, the MP shall have submitted a safety management system in accordance with the requirements of the Gas and Electricity (Consumer Safety) legislation and "Code for the Safe Installation of direct-connected whole current electricity metering in NSW".

All metering works are to be undertaken in accordance with the safety management system.

Individuals are required to be authorised by the relevant MP prior to undertaking any metering works.

At the completion of the work the installer shall perform tests on all work carried out to ensure its safe operation before connecting it to the customer's electrical installation. These tests, where applicable, include correct connections, polarity, phase rotation (before and after and where applicable), neutral integrity, insulation resistance and earthing integrity. The tests will include both visual and instrument checks.

1.9 Certificate of Compliance – Electrical Work (CCEW) for Metering

To meet with the requirements of the Gas and Electricity (Consumer Safety) Regulation 2018, the metering equipment installer shall complete a Certificate of Compliance – Electrical Work (CCEW) form when metering works are undertaken. A copy of the form shall be forwarded to:

- (a) The person that the work was carried out for, and
- (b) Building Commission NSW.

The form is to be provided as soon as reasonably practicable (but in any event no later than 7 days) after the completion of works.

As well as the completion of the CCEW form, the metering equipment installer is required to complete the “Smart meter tool”, located on NSW Fair Trading’s web site.

1.10 Provision of Installation

1.10.1 Sealing

The customer shall provide for the fitting of seals to metering equipment, or to parts of the electrical installation as required by these MIRs and the National Electricity Rules. For metering equipment, the provision shall be approved by the MP. Seals shall be affixed in circumstances where they are necessary in the opinion of the MP or required by these MIRs or law. These circumstances may include:

- preventing obstruction or diversion of the supply of electricity,
- avoiding interference to other customer’s supply,
- securing the metering of the electricity supply,
- any other purposes relating to the agreement with the customer, and
- other requirements as specified in Chapter 7 of the National Electricity Rules.

In general, sealing is required for all connections on the line side of the meters and certain other connections associated with metering.

Refer to section 2.13 which provides details for sealing.

1.10.2 Customer with maximum demand rated above 80A

A low voltage customer with a maximum demand of more than 80A per phase, or in some regional areas, 80A single phase, may be subject to additional metering requirements. The customer shall not proceed with work until they know the requirements for metering equipment.

Where the maximum demand of an installation to be separately metered exceeds 80A per phase the MC will require that the meter be a current transformer (CT) type.

In some regional areas, where only single-phase supply is available and the maximum demand of an installation to be separately metered exceeds 80A the MC will require the meter to be a single-phase CT type.

1.10.3 Replacement of existing type 5 or type 6 metered installation with loading between 80A and 100A

When an existing type 5 or type 6 meter has been replaced with a type 4 or type 4A meter and the actual loading of the existing electrical installation is greater than 80 amps and less than 100 amps there is a possibility that the fitment of an 80A fuse in the MPD may cause issues with loss of supply due to fuse operation.

In this instance, after proving that the electrical load is above 80A but below 100A, a 100A fuse may be fitted to the MPD provided that the following risks have been discussed with and are formally acknowledged by the owner or operator of the electrical installation. The risks being that:

- the meter may be exposed to potential damage if the meter experiences a fault current that is not cleared quickly enough by the larger fuse,
- the limiting of the maximum demand or alternatively the upgrade to CT metering should be considered,
- other potential issues may arise due to the overload conditions, e.g., MPD burning out, and
- the owner, operator or any person who has the contract with the electricity retailer may be responsible for the replacement cost of the meter should damage to the meter occur.

Signage is to be provided to indicate that the MPD has a 100A fuse installed. This is additional to the normal labelling requirements.

1.11 Definitions

For the purpose of these MIRs, the following definitions and those of AS/NZS 3000 apply.

If a word or term is not specifically defined, the commonly understood meaning applies. Where the terms voltage and current are used without further qualification, they imply r.m.s. values.

1.11.1 Alteration

A modification to part(s) of an electrical installation. The replacement or upgrading of a type 5 or 6 meter with a type 4 or 4A meter is included as an alteration.

1.11.2 AS/NZS 3000

Means AS/NZS 3000 Electrical installation (known as the Australian/New Zealand Wiring Rules).

1.11.3 Australian Energy Market Operator (AEMO)

Means the Australian Energy Market Operator Limited (CAN 072 010 327).

1.11.4 Connection Point

Means as defined by the National Electricity Rules: in relation to a declared shared network and a distribution network (other than an embedded network), the agreed point of supply established between Network Service Provider(s) and another Registered Participant, Non-Registered Customer or franchise customer and includes a parent connection point.

In relation to other transmission networks, the point at which power flows to or from a person connected to the transmission network can be isolated from the transmission network. If there is more than one such point, the Network Service Provider and that person will agree which point is the connection point in their connection agreement.

In relation to an embedded network, the child connection point, unless otherwise specified.

Examples and a further definition of a connection point can be found in the Service and Installation Rules.

1.11.5 Customer

Is an individual or entity who (either personally or through an agent) applies for or receives or makes use of a connection of an electrical installation to the electricity distributor's distribution system.

1.11.6 Electrical Installation

Means as defined by the *Gas and Electricity (Consumer Safety) Act 2017*: any fixed appliances, wires, fittings, meters, apparatus or other electrical equipment used for (or for purposes incidental to) the conveyance, measuring, control and use of electricity in a particular place, but does not include any of the following:

- (a) Any electrical equipment (other than a meter) used, or intended for use, in the generation, transmission or distribution of electricity that is:
 - (i) Owned or used by an electricity supply authority, or
 - (ii) Located at a place that is owned or occupied by such an authority.
- (b) Any electrical article connected to, and extending or situated beyond, any electrical outlet socket,
- (c) Any electrical equipment in or about a mine,
- (d) Any electrical equipment operating at not more than 50 volts alternating current or 120 volts ripple-free direct current,
- (e) Any other electrical equipment, or class of electrical equipment, prescribed by the regulations.

An electrical installation may be comprised of multiple separate electrical installations, for example:

- (i) Strata title developments
- (ii) Embedded networks
- (iii) Shopping centres
- (iv) Buildings with separately metered subletting arrangements
- (v) Previous arrangements of subtractive metering

1.11.7 Electricity Distributor (Distributor)

Means the electricity distributor (Distributor) within whose distribution area any electrical installation or installation work is situated or where the installation work is connected.

Note: Sydney Trains is the distributor for electrical installations on railway land and for a limited number of customers supplied from the rail network.

1.11.8 Embedded Network Metering

A metering network (child meter) which is connected via a parent meter to the distribution system. This may include both on-market and off-market metering.

1.11.9 Metering Coordinator (MC)

An entity registered with AEMO responsible for the appointment of a MP and Metering Data Provider at a connection point. They have overall responsibility and accountability under the National Electricity Rules for the provision, installation, maintenance of a metering installation, as well as the managing access to and the security of the metering installation.

1.11.10 Metering Equipment

Equipment used to, and in conjunction with, the measurement of the electricity consumption at a metering installation as defined by the National Electricity Rules.

This includes:

- (a) Meter
- (b) Meter protection device(s)
- (c) Supply neutral bar
- (d) Meter active bar(s)
- (e) Meter neutral bar(s)
- (f) Metering current transformers
- (g) Metering fuses
- (h) Meter test block
- (i) Metering voltage transformers

This does not include:

- (i) Electricity distributor owned load control equipment
- (ii) Electricity distributor non-revenue metering equipment
- (iii) Metering Provider non-revenue metering equipment
- (iv) Other metering equipment installed at an electrical installation for any other purpose

1.11.11 Meter Protection Device (MPD)

A fuse or fuses located on the line side of the meter, intended for the isolation and protection of the whole-current meter.

1.11.12 Metering Provider (MP)

An entity that meets the requirements listed in schedule 7.2 of the National Electricity Rules and has been accredited and registered by AEMO to provide, install, and maintain metering installations and has had a Safety Management System submitted to Building Commission NSW.

A Metering Coordinator will engage a MP.

1.11.13 Meter and Installation Rules (MIRs)

Means the Metering and Installation Rules of New South Wales, this document, as amended from time to time.

1.11.14 Repair

Means a restoration to an acceptable operating or usable condition, a broken, damaged or failed device or item of equipment or part therefore e.g., 'like for like' replacement.

1.11.15 Route length

For CT metering, the route length is the distance of the cable run between pieces of equipment in one direction only.

1.11.16 Service and Installation Rules (SIRs)

Means the Service and Installation Rules of New South Wales as amended from time to time.

1.11.17 Service Protection Device (SPD)

Terminology previously used to describe the first protection device on a customer's switchboard complying with previous SIRs. This term is not applicable for these MIRs.

Note: A single protection device may still be utilised but is not classified as service equipment.

1.11.18 Shall

Indicates a statement is mandatory and alteration to the requirement is not permissible.

1.11.19 Type 1, 2, 3 and 4 meter

Metering equipment that complies with the type 1, 2, 3 and 4 requirements of Chapter 7 of the National Electricity Rules and is registered as such. These meters are characterised as smart meters recording electricity consumption and are read remotely.

1.11.20 Type 4A meters

Metering equipment that complies with the type 4A requirements of Chapter 7 of the National Electricity Rules and is registered as such. These meters are characterised as smart meters recording electricity consumption and are read manually.

Metering equipment that is not connected to a telecommunications network and are not able to be remotely read or operated.

1.11.21 Type 5 & 6 meters

Metering equipment historically provided and installed by electricity distributors and/or electricity networks for small customers. These meters are characterised as interval (type 5) or accumulation (type 6) meters that are manually read. These meters are no longer installed, as smart (advanced) meters are mandated for all new and upgraded metering installations.

2 LOW VOLTAGE METERING EQUIPMENT

2.1 Customer Requirements

The customer shall arrange to provide and have installed at the customer's cost:

- a) MPD as defined in these MIRs,
- b) the metering enclosure or equivalent reserved meter rooms area, as defined by these MIRs,
- c) associated wiring and connections in accordance with AS/NZS 3000,
- d) any additional metering equipment as required by the electricity distributor or the MC, and
- e) any other equipment as required to support the installation of metering equipment and any associated network devices required for the metering installation.

The metering enclosure/area shall be in a location and in conditions acceptable to the MC, MP and in accordance with these MIRs and chapter 7 of the National Electricity Rules.

Metering shall be in accordance with the requirements of the MC.

The customer's electrician will determine the maximum demand, in accordance with AS/NZS 3000, for the separately metered parts of the electrical installation. Direct connected metering may be used where maximum demand does not exceed 80A per phase. Where maximum demand exceeds 80A per phase, current transformer metering is required.

In some regional areas a single-phase supply is only available. In these areas CT metering will be required when the maximum demand exceeds 80A single-phase.

2.1.1 Existing installations

In general, where metering installations are changed or relocated, metering arrangements required by these MIRs apply.

Replacement of existing and/or installation of additional metering equipment on an existing board may be undertaken if the additions can be accommodated using the existing meter panel(s). If the existing meter requires removing or relocating, it cannot be reinstated and shall be replaced with an advanced meter.

If it is necessary to install additional panels, these panels may be either:

- (a) in the standard arrangements which are outlined in these MIRs, or
- (b) as agreed by the MC.

If the existing metering point is located on a distributor's pole, the existing metering position can be utilised for the installation of the replacement meter provided that the meter panel and enclosure are in serviceable condition and adequate size for the installation of all equipment as required by these MIRs. If the meter panel and/or enclosure are not in serviceable condition or of inadequate size for the installation of all required equipment, the distributor shall be consulted to discuss alternative arrangements.

Where new tenancies are created in an existing installation and insufficient room exists at a common metering point, the metering may be located elsewhere as approved by the MC. The metering shall not be located within a tenancy.

Exception: Metering may be allowed to be installed within a tenancy within an existing installation if no viable alternatives exist. Approval for metering location within a tenancy will need to be gained from Building Commission NSW and the MC prior to the installation of the metering equipment.

2.2 Location and Accessibility of Metering Equipment

Metering location shall be in accordance with these MIRs and any specific requirements provided by the MC. If a requirement of the MC and/or MP contravenes any of the requirements contained within these MIRs, the requirement of these MIRs prevails.

The metering point shall be located as close as practicable to the connection point.

The customer shall ensure that access to any enclosure for metering equipment is never restricted or made unsafe. The location shall always be kept clear.

If access is obstructed the customer shall remove the obstruction or arrange to have the metering equipment relocated.

Rooms or enclosures dedicated to house metering equipment shall be well lit, clean, unobstructed, and not used for storage of materials or equipment. The door(s) of rooms and enclosures housing metering equipment shall be labelled "Electricity Meters".

Exception: The requirement for the labelling of doors of enclosures housing metering equipment does not apply to domestic and residential installations which are utilising a standard domestic switchboard/meter box.

Metering equipment, including MPD(s) and downstream customer isolation equipment, is to be easily accessible to the MP within normal working hours.

Where the metering equipment is located at an elevated position, the customer shall provide access to that elevated position as specified in AS 1657 'Fixed platforms, walkways, stairways and ladders – Design, construction and installation'. The access shall be maintained and kept in a safe condition of use by the customer.

For new electrical installation and any relocation of a metering position, any gas meter, water meter, fittings, enclosures, or other obstructions installed below the metering panel shall not project further than 300mm from the face of the wall on or in which the metering panel is mounted.

The customer shall provide and maintain adequate space in front of the metering equipment panel or cabinet, to enable the equipment to be operated, adjusted and ensure safe egress when working on the metering equipment.

For new electrical installation and the relocation of a metering position, the following minimum requirements apply.

The space shall:

- (a) be flat and level,
- (b) enable the door or panel to be opened to a minimum of 90° or removed, and
- (c) provide a vertical clearance of not less than 2 metres from the ground, platform or floor and minimum horizontal clearance of not less than 0.6 metres from the:
 - (i) equipment mounted on the hinged panel, or

(ii) external front edge of the switchboard enclosure,
whichever point protrudes the most.

A hinged meter panel shall be able to be extended to a 90° open position when all equipment has been fitted.

When a hinged meter panel is extended on its hinge to the 90° open position, a clearance of 600mm is required to be maintained between the front face of the panel and any fixed object.

2.2.1 Wiring and equipment

Any wiring and/or equipment installed behind the hinged meter panel shall be arranged as to ensure no damage is possible to cables or equipment upon the closing of the panel.

Provide a clearance of 175 mm from the front of the panel to the door when the panel is in the closed position.

For fixed meter panels the clearances for a switchboard as described in AS/NZS 3000 are to be adhered to.

Note: The *Local Government Act 1993* requires compliance to the National Construction Code for **exits for fire escape** purposes, or any corridor, hallway, lobby or the like leading to such an exit. This does not apply in single dwellings. In the case of buildings being altered or the use being changed, the local council may require an existing building to be brought up to this standard.

ADVICE

Whenever a property or building is of a type which may be subdivided, care should be taken to ensure that the meters and wiring are located within the area which would be set aside as common property or within the individual lot supplied thereby. Wiring installed within an individual lot shall be associated only with that lot unless a suitable easement has been created.

2.2.2 Single domestic installation

Note: For this clause a single domestic installation includes multiple metered supply at a single domestic/residential installation, e.g., granny flat, duplex, home business.

The metering equipment shall be located where ready pedestrian access is maintained, in one of the following locations:

- (a) on the face of the residence facing the front boundary, or
- (b) on the adjacent side wall within 1.5m of that face or associated corner window or veranda, or
- (c) on a private pole, or
- (d) within the structure of the front boundary fence so that maintenance of metering equipment may be carried out without introducing a safety hazard. Meter location will be determined by the MC.

Where the main entrance is on the side of a residence the metering equipment may be installed on that side not further than 1.5 metres beyond the main entrance subject to access being available.

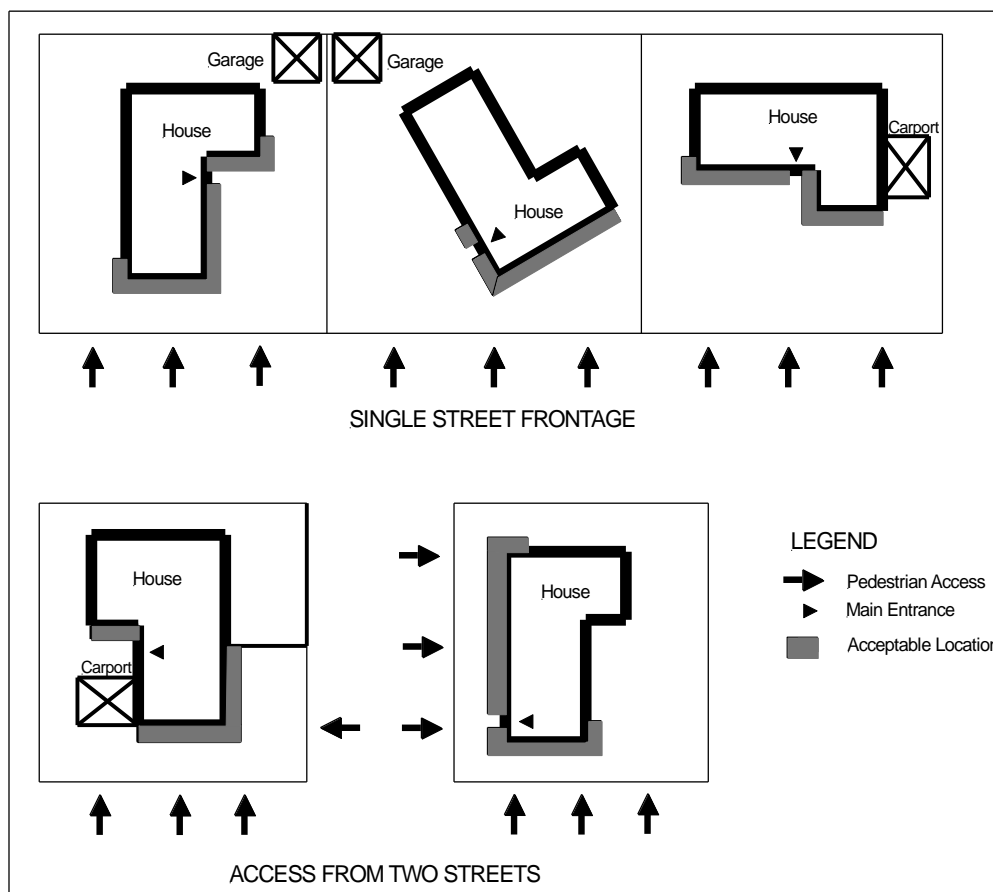
Suitable locations are shown in Figure 2-1.

The meter position shall not be located behind fences or locked gates.

Where a perimeter or security fence is erected between the building and the access street it is recommended that a suitable vandal resistant meter box be installed in the fence.

As equipment located in the metering switchboard may produce slight noise the installation of the metering switchboard on a bedroom wall should be avoided.

Figure 2-1 Suitable Metering Locations for Single Domestic Installations



Notes to Figure 2-1:

1. The metering equipment position must not be located behind fences or locked gates.
2. Where a perimeter or security fence is erected between the building and the access street it is recommended that a suitable vandal resistant box be installed in the fence.

2.2.3 Single business premises

Unless otherwise approved, the metering equipment shall be located as close as practicable to the entrance of the premises and shall be readily accessible to the MP.

In addition, metering equipment shall not be located in areas intended for product display such as shop windows or where access is restricted during normal operations for security, health or other reasons.

The metering equipment for single business premises within a multiple occupancy shall be grouped at the associated common switchboard, external to the tenancies.

Access shall be available during normal business hours.

2.2.4 Multiple occupancy premises

The metering equipment for new multiple occupancy premises will generally be grouped at the one metering position.

The grouped metering service equipment shall be in a location accessible to all associated tenants. It shall not be located within any one occupancy.

MPDs shall be in the same location as the metering and clearly marked with which tenancy they are supplying.

For practical reasons it may be necessary to provide more than one metering equipment position. The following clauses shall be applied:

2.2.4.1 Multi-storey and high-density residential developments

In multi-storey and high-density residential developments, the metering equipment may be grouped on each floor or on each alternative floor.

2.2.4.2 Medium density residential

Metering equipment shall not be located within any individual occupancy's right of way in medium density residential developments (e.g., town houses, villa units, cluster homes, duplex units), and domestic installations which include a separate flat or unit.

Metering equipment may be provided at each separate building providing that it meets with the accessibility and other requirements of these MIRs.

2.2.4.3 Factory unit developments, shopping centres and malls

For factory unit developments, shopping centres and malls, locate the metering equipment external to the tenancies.

Metering equipment and individual isolation devices shall not be located within any individual occupancy's right of way.

2.2.4.4 Embedded networks metering

The location and accessibility of an embedded network metering, both on-market and off-market metering, shall meet the same requirements as provided in clause 2.2 and its sub-clauses.

2.3 Unsuitable Locations

Metering equipment shall not be installed behind locked gates.

In addition, the following locations are considered unsuitable for mounting metering equipment:

- Over stairways or ramps, in narrow passageways, or in confined spaces.
- In vehicle docks, driveways of commercial and industrial premises, factory passageways where the equipment, or a person working on it, would not be effectively protected.
- In close proximity to, or over, machinery or open type switchgear.
- In locations which are liable to be affected by fumes, vibration, dampness, or dust, which may cause deterioration of equipment or unsatisfactory working conditions.
- In hazardous or prohibited switchboard locations as defined in AS/NZS 3000.

- Where the normal ambient temperature exceeds 50°C.
- Where there is insufficient lighting.
- Where the use of a portable ladder would be necessary.
- Where projections at head height are a hazard.
- In pool or spa zones as defined in AS/NZS 3000.
- In carports.
- On enclosed verandas.
- In areas enclosing dogs.
- In areas with unrestrained livestock or domestic pets.
- In areas to which access is normally restricted - for security, health or other reasons. (This would include areas in which animals are kept for security reasons).
- Behind a fence without a gate.
- Within gas emitting devices exclusion zone, as per AS/NZS 3000.
- Within LPG cylinder minimum clearance to ignition sources refer to AS/NZS 5601.
- In fire isolated stairways, passageways or corridors.
- Where access is restricted by vegetation.
- On the electricity distributor's asset.

Exception: Metering equipment may be installed on an electricity distributor's asset if the electricity distributor has provided formal approval of the location of the metering equipment.

2.4 Hazards of Existing Meter and Switchboard Panels that may Contain Asbestos

Work should not be undertaken that disturbs the integrity (e.g., drilling) of existing meter or switchboard panels that may contain asbestos, within electrical installations, without taking suitable precautions. Information in this regard is available from the SafeWork NSW website (www.safework.nsw.gov.au) which lists relevant industry safety guidelines and model procedures.

WARNING – ASBESTOS

Historically, asbestos has been used in switchboard panels used in electrical installations. All personnel who work on switchboard panels need to identify if this hazard may be present, and if necessary, adopt approved industry procedures when working with switchboard panels.

Note: Any metering or other equipment removed from a switchboard panel which may contain asbestos is to be treated as having asbestos contamination and shall not be reinstalled. Any contaminated meter(s) shall be returned or disposed as per the requirements of the electricity distributor or the MP. Any other contaminated equipment shall be disposed according to WHS, Environment Protection Authority and asbestos handling requirements.

Existing electromechanical meters that have black Bakelite main covers with glass window may incorporate asbestos containing material and shall be treated as containing asbestos material.

2.5 Facilities for the Installation of Metering Equipment Panels

Metering equipment may be installed on hinged or fixed panels.

A hinged panel shall be supported by a minimum of two metallic hinges when in the open position.

Fixed panels shall be arranged to allow access to the rear of the panels by the use of removable sections (covers) which provide access.

Metering and other equipment shall not be installed on access covers which are needed to gain access to the rear of the metering panels.

All new or replacement metering equipment panels shall:

- (a) not use materials containing asbestos,
- (b) be of durable, non-conducting, fire resistant material with low water absorption properties,
- (c) provide sufficient space for the installation of metering equipment. Possibility of future additional metering equipment should be taken into consideration, and
- (d) be of a suitable thickness as to ensure that the panel is of adequate mechanical strength and rigidity.

The minimum space requirements for mounting of individual meters are shown in Table 2-1.

Table 2-1 Minimum Space Requirements for Meters

Meter Equipment Type	Height (mm)	Width (mm)
All Meter Types	300	190
Minimum clearance between meters and between meters and other equipment	10	10

2.5.1 Fixed Metering Equipment Panels

Fixed meter equipment panels shall meet the following requirements:

- (a) no point of the metering equipment panel shall be located more than 400mm from the nearest means of access,
- (b) the distance from the back of the metering equipment panel to the wall or immovable structure shall be not less than 150 mm, and
- (c) the minimum size of the means of access to the rear of the panel shall be 200 mm in any direction and clear of obstructions.

Access may be obtained by the removal of covers designed to provide access.

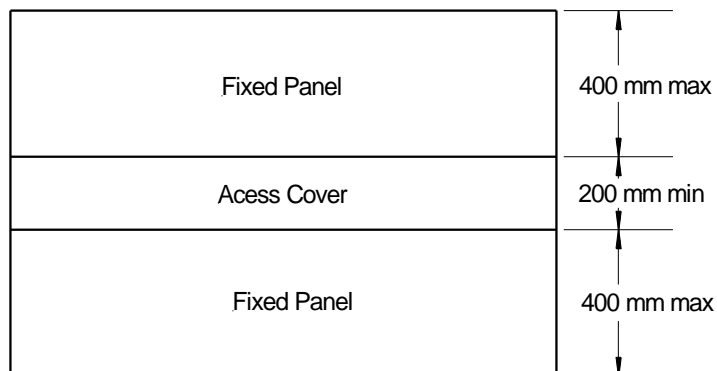
Metering active and neutral bars maybe installed behind access covers provided clear access to the rear of the panel is maintained.

Metering equipment or other equipment shall not be installed on the access covers.

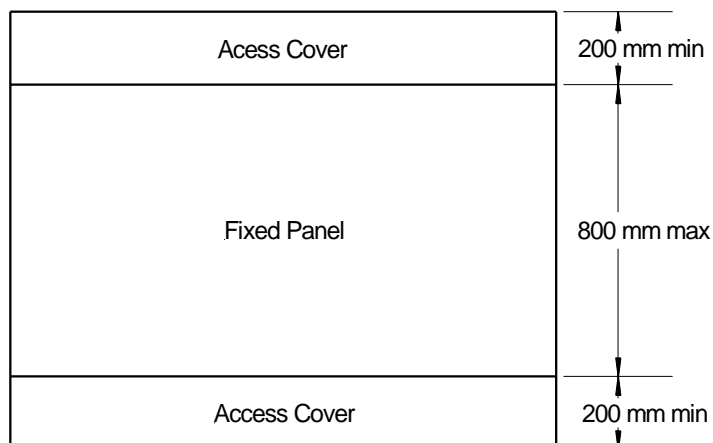
Figures 2-2 (a) to (d) provide guidance to acceptable fixed panel arrangements. Other arrangements may be utilised providing they meet the above requirements.

Figure 2-2 Fixed Meter Panel Arrangements

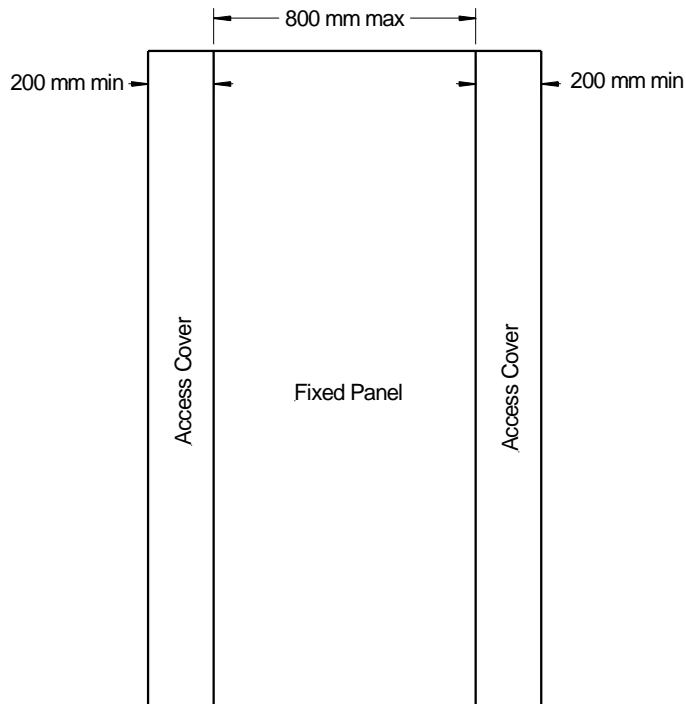
(a) Centre access cover



(b) Top and bottom access covers



(c) Side access covers



2.5.2 Metering Equipment Enclosure

Metering equipment enclosures shall be provided and installed in accordance with the requirements of AS/NZS 3000.

2.5.3 Physical Protection of Metering Equipment

Metering equipment shall be protected from:

- (a) the weather,
- (b) mechanical damage,
- (c) salt or dust laden air or corrosive atmospheres, and
- (d) vandalism.

An enclosure shall be fitted with a door and catch. If the door is hinged, a stay shall be provided which is fastened to the enclosure. The stay shall enable the door to be held securely in the open position and at an angle greater than 90°.

2.5.4 Isolated and Unattended Locations

Where metering equipment is installed in an enclosure externally on a building or a pole in an isolated and unattended location, the enclosure shall be constructed using galvanised steel or equivalent material of sufficient strength to achieve protection against vandalism, weather, and other external factors.

2.5.5 Fixing of Meter Equipment Surrounds and Enclosures

Ensure the facilities for mounting metering equipment and associated surrounds and enclosures, are securely fixed to a wall or rigid supporting structure.

2.5.6 Fixing of the Metering Equipment

Meters shall be installed utilising a minimum of 3 fixing points. These points shall be located at the top, left side and right side of the meter.

All other metering equipment, except metering CTs, is to be secured using all available fixing points.

Fixing equipment used to secure the metering equipment to the panel shall meet the following requirements:

- (a) bolts and/or screws used to fix metering equipment to panels shall be of adequate strength to secure the metering equipment without risk of deformation or breakage of bolt and/or screw or panel,
- (b) of a type approved for use. For approved types refer to Table 2-2,
- (c) fitted with a nut unless of a self-tapping type or panel screw,
- (d) shall not protrude more than 10mm past the rear of the panel,
- (e) shall not be capable of damaging any conductor insulation,
- (f) self-tapping type shall utilise at least 75% of the panel thickness,
- (g) self-tapping type shall not protrude past the rear of the panel, and
- (h) mounting bolts and/or screws which protrude through the meter panel and can be contacted from the front of the panel shall be of a suitable non-conducting type, e.g., nylon or plastic.

Metering equipment shall not be located closer than 32mm from the hinged edge of the panel.

Table 2-2 Approved Fixing Methods

Panel Material Type	Approved Fixing Type	Minimum Fixing Diameter	Maximum Pilot Hole Diameter
Black Bramite Type X (Paper Phenolic) insulating panel <20mm thickness	Machine bolt/screw with nut Electrical Panel Screw	4mm M3	5mm 3mm
Black Bramite Type X (Paper Phenolic) insulating panel ≥ 20mm	Machine bolt/screw with nut Electrical Panel Screw Self- tapping type	4mm M3 5mm (12 gauge)	5mm 3mm 4mm
White PVC <20mm thickness	Machine bolt/screw with nut Electrical Panel Screw	4mm M3	5mm 3mm
White PVC ≥ 20mm thickness	Machine bolt/screw with nut Electrical Panel Screw Self- tapping type	4mm M3 5mm (12 gauge)	5mm 3mm 4mm
Existing Asbestos	Machine bolt/screw with nut	4mm	5mm
Existing Timber <20mm thickness	Machine bolt/screw with nut	4mm	5mm
Existing Timber ≥ 20mm thickness	Machine bolt/screw with nut Wood screw	4mm 10 gauge	5mm 3mm

Notes:

1. Metal screws with needle points and self-drilling tips which protrude past the rear of the panel are not permitted.
2. Larger fixing screws may be utilised. Maximum pilot hole diameter, for metal bolt/screw with nut, is to be not more than 1mm larger than the diameter of the bolt/screw.
3. Other fixing types may be used provided they meet with minimum fixing standards and are approved by Building Commission NSW and the MC.

2.5.7 Height of the Metering Equipment

All metering equipment shall be located so that the bottom edge of the metering equipment is more than 500mm and the top edge of the metering equipment is less than 2000mm from the ground, floor or platform of access.

Exceptions:

1. *When replacing or installing a meter or metering equipment on an existing metering panel, metering equipment may be mounted below 500mm or above 2000mm provided it is not installed any higher or lower than the existing metering equipment.*
2. *When locating a meter or metering equipment on an electricity distributor's asset which is located in a public area, e.g., metering equipment located on an electricity distributor's pole for the metering of an electric vehicle charging station.*

2.6 Connections at Metering Equipment

The customer shall arrange with the electricity retailer to have a MP, or their authorised installer, install and connect the metering equipment. If cables other than thermoplastic,

elastomer, or XLPE insulated stranded copper-conductor cable are used, the cables shall be joined, or connected in an approved manner, to a cable of the required type and size for connection to this equipment.

2.6.1 Cable Preparation and Termination

The following and manufacturer's guidelines are to be adhered to with regard to the preparation and termination of cables into metering equipment.

All cables connecting to metering equipment shall be prepared and terminated in the following manner:

- only a single conductor per terminal is permitted,
- where the meter terminal will permit, single cables with a cross sectional area of less than 10mm² shall be twisted and doubled over when terminated into the meter terminal,
- soldering is not acceptable,
- cables shall be adequately secured under all available termination screws, and
- there shall be no more than 1mm of exposed conductor protruding from termination when located under a sealed enclosure.

Install meter wiring of not less than 4mm² on the load side of the meter protection device(s) and supply/meter neutral bar. The wiring shall be suitable for the maximum demand current that it will carry.

Exception: For installations containing twin element off-peak water heaters or require the use of a contactor as per clause 2.10, two cables may be connected into the meter load terminal. The two cables shall be twisted together.

2.6.2 Arrangement of Metering Neutrals

Each metering device shall be supplied by a separate neutral conductor with a minimum size of 4mm². The neutral conductor shall be connected to a separate terminal of the supply neutral bar, or an additional neutral bar that will serve as a meter neutral bar.

2.7 Locking of Metering Enclosures

Locking of a meter enclosure is acceptable if the key to the lock is readily available for use by the MP and the electricity distributor.

For maintenance and operational purposes, the MP and electricity distributor may require access to metering equipment during daylight hours.

In the event of an emergency, access to electrical switchboards may be required at any time.

2.8 Protection for Whole Current Meters

The customer shall arrange for the installation and maintenance of an approved MPD in accordance with the following sub clauses.

A single MPD may protect multiple metering devices provided all devices are installed for a single National Metering Identifier (NMI) installation. A single NMI metering installation may include a number of meters, e.g., controlled load meter.

2.8.1 MPD for Low Voltage Installations up to 80A per Active Conductor- Whole Current Metering.

Whole current meters shall be protected by a HRC fuse with a fuse link rating which does not exceed 80A. Alternative fuse element ratings may be used but in no case, can the time-current protection rating exceed that of an 80A HRC fuse.

Exception: See clause 1.9.4 for replacement of existing whole current meters with an existing loading of over 80 amps.

The MPD shall be located directly adjacent to the meter.

Exception: If the MPD is unable to be installed adjacent to the meter the following requirements apply:

- (a) the MPD shall be installed in a position that is readily accessible to the meter and clearly labelled to indicate which meter it protects, and*
- (b) multiple MPDs for the same meter are to be grouped together.*

Meter protection devices shall always be installed on the line side of the whole current meter.

If more than one MPD per phase is required to be installed, an active bar may be installed and the MPD connected via an active bar. Each MPD shall be connected to an individual terminal of the active bar.

No connections are to be made from a MPD to supply other MPDs.

MPDs shall not be located on a removable panel which is required to be used to gain access to the rear of the metering panel.

2.8.1.1 MPD as Overload Protection Devices

For new installations and installations where consumers mains are upgraded, MPDs shall not be permitted to be used as an overload protection device(s) for the consumers mains as required by AS/NZS 3000.

For existing installation where the existing service fuse/SPD is being used as overload protection device refer to clause 4.3.

2.8.2 Existing Installations

When an existing meter is replaced, a MPD shall be installed to protect the new meter.

An existing service fuse/SPD assembly maybe used as the MPD provided it is fitted with a suitably rated HRC fuse cartridge and is appropriately labelled.

2.8.3 Plug-in Meters

For plug-in meters, the MPD shall be arranged so that the removal of the MPD fuse carrier isolates the supply to the active pins of the plug-in meter base.

2.8.4 Selection of fuse carrier and base ratings for fuses as MPDs

The current rating of any fuse carrier and fuse base combination (the fuse assembly) used for a meter protection device shall always be equal to or greater than the fuse element rating, but in no case less than 100 amps.

The meter protection fuse assemblies shall comply with the following requirements:

- (a) the meter protection fuse assembly shall accept a Type 11b 80A current HRC fusible link,
- (b) the fuse assembly shall have a sealable escutcheon, known as an anti-intrusion assembly, which prevents access to the terminals,
- (c) the fuse assembly may be either front or back connected,
- (d) connect one conductor only to each separate terminal,
- (e) protect unused terminals from accidental contact,
- (f) where the MPD consist of a base, insulating cover (turret) and fuse carrier, the insulating cover (turret) shall be secured before the fuse carrier is inserted,
- (g) where insulating barriers are provided on one terminal only, this terminal shall be used for the line side connection of the fuse. All provided barriers are to be installed,
- (h) if specialist tools are required to be used to make the connections into the fuse base, the fuse manufacturer's instruction shall be adhered to, and
- (i) the fuse link (cartridge) shall have the following dimensions: 30mm diameter and 57mm in length.

The fuse carrier does not have to be sealed to the fuse base.

All MPD HRC fuse links have the potential to contain friable asbestos materials. Exposure to the asbestos inside may occur through accidental or mechanical damage. As such, when fuse links are replaced, they shall be removed and disposed of as asbestos waste. More information can be found on the SafeWork NSW website.

2.8.5 Identification

The MPD shall be clearly identified.

Every MPD or groups of MPDs shall have the fuse link element rating clearly marked adjacent to the device.

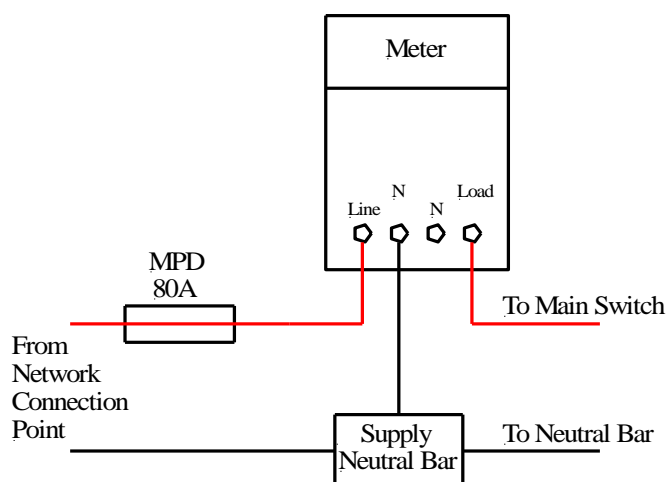
All labelling is to be in a legible and durable manner, and in accordance with AS/NZS 3000.

2.8.6 Examples of Metering Connection Arrangements

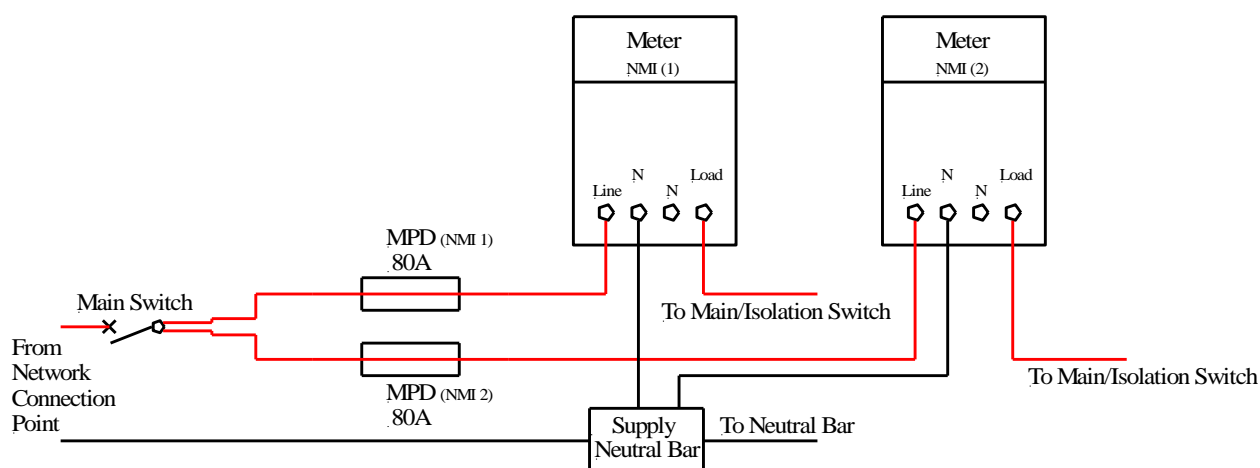
Figures 2-3 (a) to (d) provide examples of metering connection arrangements. Other arrangements may be used. MP should be consulted prior to the use of an alternative arrangement.

Figure 2-3 Examples of Meter Connection Arrangements

(a) Meter connection with MPD



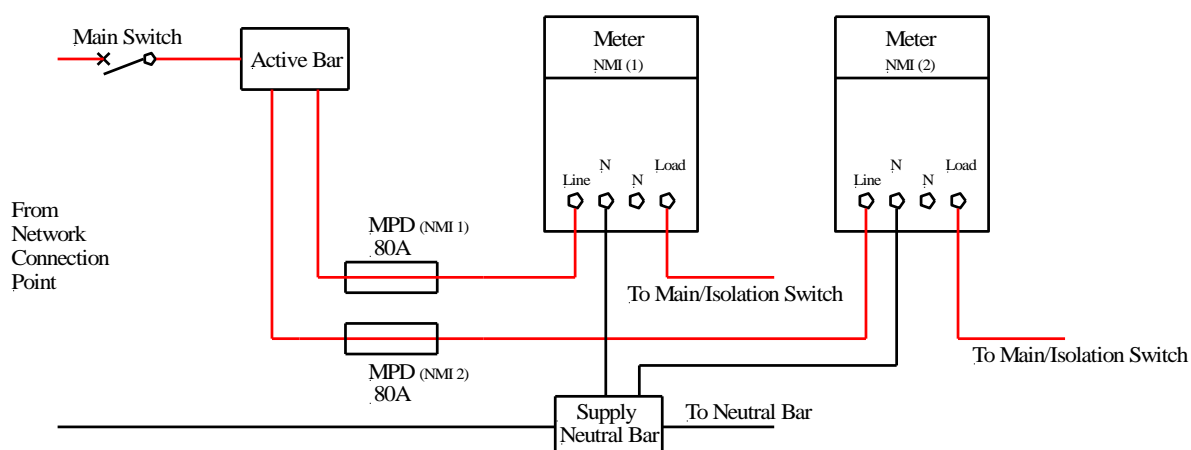
b) Meter Connections for Separate NMI Customers Utilising a Main Switch



Notes:

- 1) Main switch can be overcurrent circuit breaker for the protection of consumers mains as per the requirements of AS/NZS 3000.
- 2) Main switch cover is required to sealable and fitted with a seal.

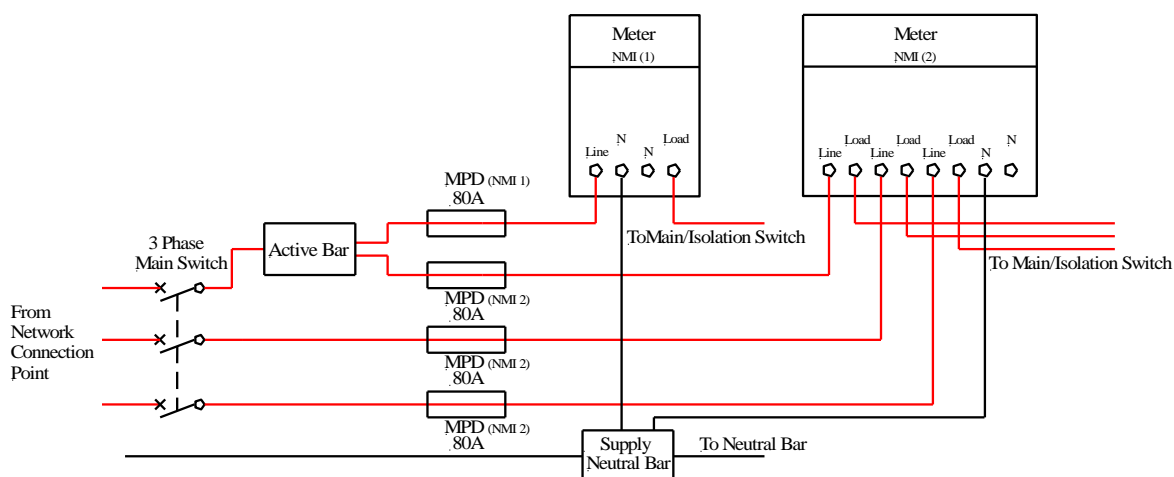
(c) Meter Connections for Separate NMI Customers Utilising an Active Bar



Notes:

- 1) Main switch can be overcurrent circuit breaker for the protection of consumers mains as per the requirements of AS/NZS 3000.
- 2) Main switch cover is required to be sealable and fitted with a seal.

(d) Meter Connections for Combined Single and Three Phase Separate NMI Customers



Notes:

- 1) Main switch can be overcurrent circuit breaker for the protection of consumers mains as per the requirements of AS/NZS 3000.
- 2) Main switch cover is required to be sealable and fitted with a seal.

2.9 Provision of Isolation of Customer Installations

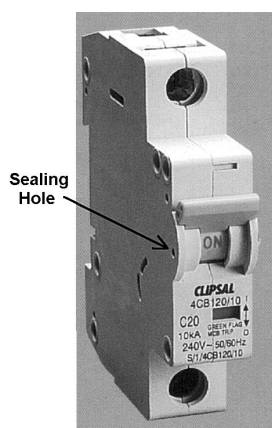
2.9.1 Whole Current Metering

For installations where whole current metering is used, a control device shall be provided on the load side of the meter and load control equipment at the enclosure where the meter and load control equipment are located, to enable each individual tariff to be isolated and sealed.

Requirements for the means of isolation are as follows.

- (a) the switch toggle shall be sealable in the open position in an acceptable manner such as with non-conductive sealing wire, not less than 1.4mm in diameter refer to Figure 2–4,
- (b) may comprise of the customer's main switch or protection device (one switch per tariff),
- (c) shall be an independent device, or group of devices, for each customer, in particular for customers within multiple installations, and
- (d) safety services (e.g., lift and fire services) may require an additional main switch and be a 3 phase switch where 3 phase equipment is installed. Refer to AS/NZS 3000.

Figure 2-4 Example of a Sealable Circuit Breaker



2.9.2 Current Transformer Metering

A sealable or lockable isolation device shall be provided for current transformer metered installations. This isolation device is to be located on the line side of the current transformer and allow each individual tariff and/or customer to be isolated.

If the electrical installation contains safety services in accordance with Section 7 of AS/NZS 3000 this isolation device will need to have facilities for being able to be locked in the “on” position. A lock will be required to be fitted to ensure that the switch cannot be accidentally operated in an emergency. The main switch(es) for the electrical installation will be located on the load side of the current transformers.

The key for the lock should be located in a suitable location where it can be readily accessed for the purpose of removing the lock to allow the operation of the isolator.

Labelling will be required to be undertaken in accordance with AS/NZS 3000.

2.10 Load Control Equipment

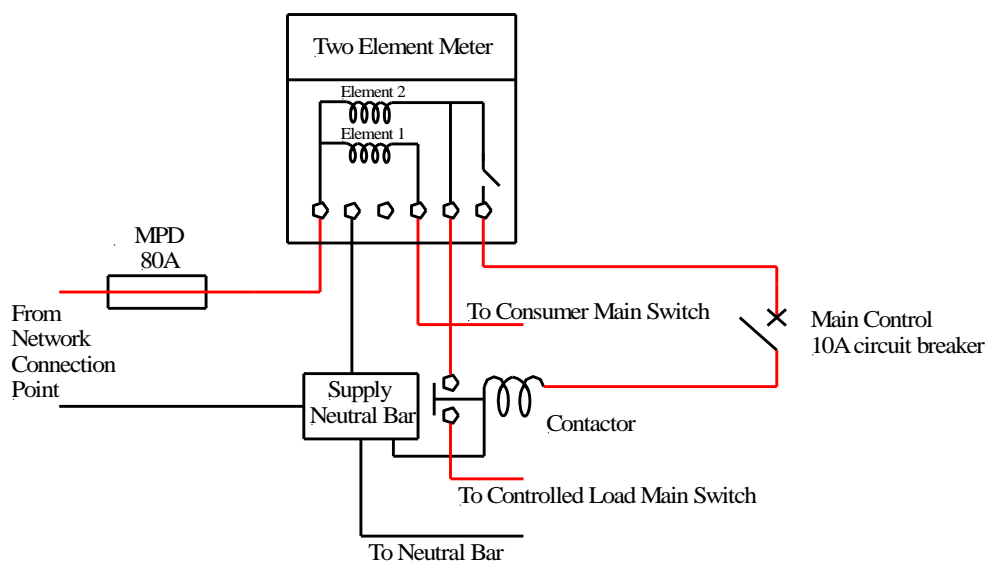
Where electricity is to be supplied only during certain hours in accordance with the provisions of a published tariff, the electricity distributor may require the MP to install a single phase two element meter or for the customer to arrange to have a single pole load control device (relay) installed to directly control the load under that tariff.

Unless approved by the electricity distributor, controlled load shall not exceed 25A single phase. Where the load exceeds 25A single phase or is inductive, the customer shall arrange to provide, install and wire a contactor so that it is operated by the load control switch of the meter or a separate load device (relay). The contactor shall be a non-latching type with provision for sealing and be installed at the metering position.

A contactor will be required to be utilised if the controlled load is 3 phase. The controlled load will be metered by a 3 phase meter.

The contactor control circuit shall be controlled and protected by a maximum 10A circuit breaker which must be sealable. Refer to Figure 2-5. The neutral conductor for the contactor coil shall be terminated in the supply neutral bar.

Figure 2-5 Controlled Load Contactor Wiring for Single Phase Two Element Meter



2.10.1 Essential Energy's Distribution Area Only

Where electricity is to be supplied only during certain hours in accordance with the provisions of a published tariff, Essential Energy may require the customer to arrange for the installation a single pole load control device (relay) to directly control the load under that tariff.

Essential Energy will either provide or specify the type of load control device (relay) to be used. Where the load control device (relay) is made up of separate relay and switch controls, the meter and relays shall be wired in accordance with the policy document, including diagrams, issued by Essential Energy.

2.11 Multiple Installations

Examples of multiple installations are:

- (a) multiple residential installations which include: a number of single domestic installations. Single domestic installations include a flat, unit or duplex unit,
- (b) groups of small shops and/or offices,
- (c) shopping malls,
- (d) factory units, and
- (e) combinations of the above.

For large multiple installation developments, contact the electricity distributor, nominated electricity retailer and MC as early as possible to prevent delays for connection of electricity.

The customer shall provide for supply to each separately metered portion of an installation that is supplied from a single connection point.

For multiple installations, main switches are required to be installed on the line side of the MPDs or un-metered active bars, the main switches shall be rated to withstand the nominal short circuit currents.

2.11.1 Arrangement of Metering Neutrals

Each metering device shall be supplied by a separate neutral conductor. The neutral conductor shall be connected to a separate terminal of the supply neutral bar, or an additional neutral bar that will serve as a meter neutral bar.

2.11.2 Meter Neutral Bar

If a meter neutral bar is required to be installed to allow the connection of additional metering equipment, the bar shall:

- (a) be an insulated type,
- (b) be fitted with a cover suitable for sealing,
- (c) have a separate terminal for each conductor which is clamped by not less than two screws or one screw if the outside diameter of the screw is not less than 80% of the tunnel diameter,
- (d) have a current carrying capacity of not less than 50 amps,
- (e) be located so that it is easily accessible and safe to work on,
- (f) not be located on a removable panel which is required to be used to gain access to the rear of the metering panel, and
- (g) be identified to indicate it is a "Meter Neutral Bar" in a legible and durable manner in accordance with AS/NZS 3000 Wiring Rules.

The conductor connecting the meter neutral bar to the supply neutral bar shall be a minimum 10mm².

2.11.3 Un-metered Active Bar

The purpose of an un-metered active bar is to enable the connection of multiple MPDs from a single connection point. The un-metered active bar shall be located on the load side of an isolating switch. The isolating switch is to meet the requirements of AS/NZS 3000 Wiring Rules.

A single connection is required between the un-metered active bar and each individual MPD.

The un-metered active bar shall:

- (a) be an insulated type,
- (b) be fitted with a cover suitable for sealing and sealed,
- (c) have a separate terminal for each conductor which is clamped by not less than two screws or one screw if the outside diameter of the screw is not less than 80% of the tunnel diameter,
- (d) have a current rating not less than that of the maximum demand of the installations to which it is connected,
- (e) be located so that it easily accessible and safe to work on,
- (f) not be located on a removable panel which is required to be used to gain access to the rear of the metering panel, and
- (g) be identified to indicate it is an 'Unmetered Active Bar' in legible and durable manner in accordance with AS/NZS 3000.

The conductor connecting the un-metered active bar to the isolating switch shall be suitable for the load to be carried by the cable.

The above requirements are also to be used for a metered active bar used in conjunction with embedded network meters.

Warning: Unless exemption for live work has been provided the active bar can only be worked on when the bar is de-energised.

2.11.4 Un-metered Submains and Equipment

The customer is to provide facilities for sealing or locking of all covers etc, providing access to un-metered equipment. The customer shall be able to replace any un-metered fuse link or operate circuit breakers without the removal of the seal or lock.

The customer is responsible for the cost of such locks.

Refer to clause 2.13 for sealing details.

2.11.5 Labelling

For multiple installations, metering equipment and any meter panels shall be clearly and permanently labelled to indicate occupancy identification for all equipment to be mounted on the panel. A plan or drawing shall be provided at the switch/metering board to show individual occupancies physical location.

2.12 Spacing between Metering Equipment and High Current Conductors

External magnetic fields may damage metering equipment. The following minimum spacings between metering equipment and current carrying conductors shall be provided and maintained.

2.12.1 Multicore and Bunched Single Core Cables

No special requirement for spacing is needed where the separation between all conductors of a circuit is due solely to the solid insulation and sheathing on the conductors, (e.g., multicore cables or a group of single core cables in flat or bunched formation).

2.12.2 Spaced Single Core Cables, Busway or Busbars

Where the separation between conductors of the same circuit exceeds that in clause 2.12.1 but does not exceed 160mm, refer to Table 2-3.

Table 2-3

Maximum Current in Conductor Nearest to Meter (A)*	Minimum Spacing between Conductor and Meter (mm)
150	Nil
200	100
400	500
600	700
1000	900
1500	1200
2000	1400
3000	1700
4000	2000

*The maximum current in the conductor is determined by the AS/NZS 3000 maximum demand for consumers mains and submains.

Table 2-3 gives the minimum spacing between any point on the metering equipment and any point on the nearest conductor of the circuit. Calculate the intermediate measurement proportionally.

2.12.3 Shielding

Spacings determined under clause 2.12.2 may be reduced if the meters or conductors are mounted within a suitable shielding enclosure. Determine the spacing by multiplying the value from clause 2.12.2 by a multiplying factor. Table 2-4 indicates the multiplying factors for various thickness of mild steel. If other thicknesses or materials are proposed, the MP will determine the factor.

Table 2-4 Spacing Multiplying Factors

Thickness of Mild Steel Plate (mm)	Multiplying Factor
5.0	0.25
2.5	0.5
1.2	0.75

e.g., using a 1.2mm thick shield reduces the minimum spacing between a meter and a 4000A conductor from 2m to 1.5m (spacing) 2000×0.75 (multiplying factor) = 1.5m.

2.12.4 Special Cases

Avoid spacings in excess of 160mm between the centres of conductors of a circuit near meters. If you can't do this, submit the details in writing to the MP, who will determine the spacing requirements from the metering equipment for you.

Some types of meters may not need the listed requirements which may be waived by the MP.

2.13 Sealing of Metering Equipment

Security seals SHALL not be removed by persons without authorisation/permission from the owner of the seal.

Where seals are broken, the entity that has broken the seal is responsible for arranging the resealing upon completion of work.

Sealing of metering equipment will need to meet the requirements of this clause and Chapter 7 of the National Electricity Rules.

All metering equipment, unmetered bars, metering bars, CT secondary terminal covers and voltage-circuit fuses for CT metering shall be sealed in an approved manner. Nylon/plastic sealing wire will generally be used.

The customer shall ensure that all metering equipment is suitably enclosed and provided with facilities for the sealing of all metering equipment.

This clause is not intended to prevent MPs from removing and replacing seals in accordance with national metrology requirements and procedures.

2.13.1 Single, Multiple and Large Installations

The customer's qualified representative shall be able to replace ruptured unmetered fuses, without authorised specialist personnel attending to remove seals and reseal equipment. Sealable escutcheon panels may be used with either front or back connected fuses to allow this.

Individual items of equipment such as unmetered and metering bars shall be sealed. In some cases, it may be better to provide a sealable cover or panel over equipment which the customer does not need to access for maintenance.

2.14 LV Current Transformer Metering

Where the assessed load of an installation or portion of an installation to be separately metered exceeds the current rating of the metering equipment, the MP will require that the meter be a current transformer (CT) type.

The customer shall provide the facilities for the mounting and connection of the current transformers, meters and associated equipment in accordance with the requirements of these MIRs and the MP.

The customer is responsible for the providing and arranging installation of:

- (a) all equipment mounting facilities,
- (b) meter panels,
- (c) voltage circuit fuses (10A current limiting (HRC)) suitable for sealing,
- (d) meter bars - used for metering purposes where the supply neutral bar cannot accommodate all the neutral cables associated with metering,
- (e) all cabling to the specified identification code fully connected to the equipment,
- (f) the CTs, and
- (g) the meter test block - used to allow in circuit testing of CT metering systems.

The MP will specify:

- (i) the current range and type of CTs, selected in accordance with the maximum demand of the installation to be metered, and
- (ii) the meter equipment to be provided.

2.14.1 Multiple Metering Sections

Where it is necessary to meter other sections of the premises, the connection point to the MPDs or metering isolators shall be on the line side of the CT metering. It is not permitted to have the connection point on the load side of a CT and pass cables through the CT in the reverse direction.

Where the primary conductor is an insulated cable, sealable bars shall be used. The wiring to the meter protection device shall be connected at these bars.

The MPD shall comply with the requirements of 2.8.1.

2.14.2 Current Transformer Facilities

Metering CTs shall be mounted in a suitable enclosure segregated from the meters and switchboard equipment.

Attention shall be paid to additional space requirements to terminate large conductors.

2.14.3 Current Transformer Enclosure - Construction

The CT enclosure shall be constructed so that a tool or article accidentally dropped by a person working on the connections cannot fall from the CT compartment into other areas of the switchboard.

CTs should be segregated from other equipment. No part of the electrical installation, including any measuring instruments and control devices, is permitted within the CT enclosure, except the customer's measurement current transformers. In this latter example the customer measurement transformers shall not be installed on the removable section of the busbar provided for the metering transformers or impede access thereto.

For other situations consult the MP.

These requirements also apply to the unmetered sections of a cubicle type switchboard unless the customer's equipment is supplied from a metered supply and physically and electrically separated from the unmetered parts.

All live conductors within 300mm of the CT secondary terminals, voltage circuit fuses and metering neutral bar shall be insulated or screened to prevent inadvertent contact. Convenient access is required for removal of CTs. These requirements may be met by the provision of a removable screen of light insulating material with openings shaped to fit over the CT secondary terminals and associated wiring. The secondary terminals, voltage-circuit fuses and metering neutral bar shall be accessible without removal of the screen. Where a screen is used it shall be fitted with two insulated handles and be secured to the switchboard.

Access to the CT secondary terminals and voltage-circuit fuse wedges shall be available without the need to isolate the supply to the CTs.

2.14.4 Vermin Proofing

All entries to the CT compartments/enclosures should be fitted with suitable gland plates, barriers etc, to prevent pests from entering.

2.14.5 Doors and Access Cover

Provide doors and access covers that are easy and safe to open or remove. If they are hinged, they shall be capable of opening to 90° minimum.

Access covers shall not be greater than 1 square metre in area. The length shall not exceed 1500mm. A handle shall be fitted to each side of the cover, slightly higher than its horizontal centre line.

Provide fixings so that the cover remains in position when the fasteners are released or removed.

2.14.6 Identification of Enclosures

The customer shall provide identification for the CT metering enclosure.

The cover, whether hinged or removable, shall:

- (a) be marked "Metering CTs Enclosed", and
- (b) clearly identify the customer.

A label with the above information shall be installed adjacent to the CTs.

2.14.7 Current Transformer Security Locking or Sealing

The CT compartment and unmetered sections of a switchboard/installation shall be sealed or locked as follows:

- (a) The CT access cover and unmetered sections shall be appropriately secured where located outdoors or remote from the meter position. The customer can lock to add extra security to prevent unauthorised operation.
- (b) The CT access cover and unmetered sections may be sealed when located within a building.

The sealing facilities shall be designed so that they can be sealed with short lengths of sealing line.

Provide sealing for:

- (i) A door - at the side of the door opposite to its hinged edge.
- (ii) A removable cover - at two approximately diagonally opposite points on the cover.

2.14.8 Current Transformer Location

Locate CTs, voltage-circuit fuses, and neutral bars so that they are more than 500mm and less than 2000mm from the ground, floor or platform of access.

2.14.9 Voltage Circuit Protection

The customer shall provide and arrange to have installed all the bars and the voltage circuit protection fuses.

All fuses shall be:

- (a) a 10A current limiting (HRC) fuse type NS in an enclosure with a minimum degree of protection of IP2X to AS/NZS 60529, or
- (b) a Class G current limiting (HRC) fuse links in a modular fuse holder.

A 10A current limiting (HRC) fuse link shall be installed in either option.

Fuses shall be suitable for sealing the fuse-link holder to the base. You can provide a sealable cover over all the fuse assemblies.

WARNING

Remove the fuse links from the fuse link holders and tie them nearby. Insert the holders into the fuse bases. The MP will install the fuse links when commissioning the metering installation.

Mount the voltage circuit fuses on a panel of insulating material. They shall be located in an accessible position to enable their safe withdrawal towards the operator whilst the supply is energised and be as close as practicable to the current transformers that they are associated with.

Provide a clearance of between 100mm (minimum) to 300mm (maximum) between the panel and the enclosure door.

Alternative forms of voltage circuit fuse mounting include:

- (a) "DIN" rail.
- (b) Securely fixed on a steel bracket provided the mounting screw hole is covered with a suitable insulating material.

2.14.10 Wiring

- (a) All wiring for metering purposes shall be installed and connected by the customer's contractor as per MP's instructions.
- (b) The insulated and sheathed cables between voltage circuit fuses, meter neutral bar and primary circuit conductors shall be adequately supported. The requirement for sheathing may be met by using PVC insulated cable enclosed in 6mm diameter clear PVC tubing with a wall thickness of 1.5mm. Apart from the connections a clearance of 25mm (min) shall be maintained from the busbars.
- (c) The current circuit cables shall be supported between the conduit and terminal blocks by tying them together. The CT meter circuit cables are to be colour identified or numbered.

2.14.11 Current Transformers

Current transformers shall be supplied by the customer. The CTs shall meet with the requirements of this clause and chapter 7 of the National Electricity Rules.

The CT ratio and type shall be selected in accordance with Table 2-5.

Table 2-5 Current Transformer Ratio and Type Selection

Acceptable Range for Expected Load Current (per phase) and Maximum Demand (Amps)	Applicable Maximum Protection Setting and/or Maximum Switchgear Capacity Compliance Limit (Amps)	CT Selection
> 80 and ≤ 400	≤ 400	S type 200/5 Extended 200% & 5VA burden rating
> 200 and ≤ 1600	≤ 1600	T Type 800/5 Extended 200% & 15VA burden rating
> 800 and ≤ 3000	≤ 3000	W Type 1500/5 Extended 200% & 15VA burden rating
> 1500 and ≤ 4000	≤ 4000	U Type 2000/5 Extended 200% & 15VA burden rating

Note: A CT operating beyond its National Electricity Rules compliance limit will mandate an upgrade of the CTs and possible switchboard upgrade.

The CTs shall be:

- Manufactured and type tested to full compliance to AS61869.1 and AS61869.2 with evidence of such compliance through the availability of type test certificates supplied from a laboratory accredited by NATA or other Accreditation Body that is a signatory of the ILAC MRA.
- Compliant with any applicable specification or guidelines specified by the National Measurement Institute under the National Measurement Act.
- Class 0.5 for type 2, 3 & 4 installations (consuming <1000GWh PA).
- Class 0.2 for type 1 installation (consuming ≥ 1000GWh PA).
- Supplied with individual phase and amplitude accuracy test results. The results shall be traceable and sourced from a laboratory that is qualified under ISO/IEC 17025. General requirements for the competence of testing and calibration laboratories and is accredited for that qualification by NATA or another accreditation body that is a signatory of the ILAC MRA and to a measurement uncertainty of ±0.1% for the amplitude error and ±0.1 crad for the phase error, based on a 95% confidence level.
- The terminals have double-ended tunnel types with two (2) screws at each end and capable of accepting 2.5mm² to 10mm² stranded cable, have a transparent, sealable cover, with terminal assemblies manufactured from either copper or brass.
- Capable of having access covers to the secondary terminals sealed to prevent unauthorised access.
- Copies of the test certificates for compliance of the CTs shall be provided to the MP and available at the switchboard and switchboard dossier.

Further information can be gained from the MP.

WARNING

Never open circuit the secondary terminals of a CT while the primary winding is energised because a very high voltage will be induced. This voltage is likely to give the person working on it a severe electric shock and cause damage to the CT insulation.

The secondary terminals of the CTs are to be short-circuited to prevent inadvertent damage and shock. The bridges are to be removed when commissioning the metering installation.

Retain the short-circuit of the secondary terminals when connecting the secondary current conductors if supply is connected.

The CTs shall be mounted with the polarity marks P1, L or a distinctively coloured dot adjacent to the terminals facing the incoming supply. The operating range of extended range current transformers shall not be exceeded.

2.14.12 Mounting of Current Transformers

The customer shall provide the mountings for the CTs.

The mountings may use fixed studs or threaded holes tapped in a suitable mounting plate.

Where the primary conductor is a busbar the CT mounting plate may be adjustable to allow for the different mounting heights of the CT suitable for the maximum current rating of the switchboard.

The mountings shall consist of 6mm (min) to 9mm (max) diameter studs, secured by brazing, or equivalent means, to a mounting plate or bar, together with nuts.

Alternatively, threaded holes at two diagonally opposite corners of a mounting plate and slotted or hexagon-headed set screws with a diameter of between 6mm (min) to 9mm (max.) are acceptable. In this case, provide dowels at the other corners to support the CTs while the set screws are removed.

Two methods of mounting current transformers are acceptable, these are:

- (a) In-line where the bodies of each CT are in one line.
- (b) Staggered where the centre phase CT is offset from the other two.

2.14.13 Primary Conductors

A removable section of busbar through each CT shall be provided.

Any wiring shall not be connected to the removable section of the busbar or the bolts or fixings which secure it.

Select the size and shape of the busbar to suit the openings in the type of CTs to be installed.

The length of the removable section of busbar shall be:

- 300mm (min) to 450mm (max) in length for CT types S, T and W.

Alternatively, you can use an insulated cable as the primary conductor passing through each CT. Arrange the cable so that the CT can be removed. Do not use more than 1000mm of cable from the CTs to the location of the line side cable connection.

The surfaces to which these conductors will be connected shall be either copper or suitably plated copper or copper alloy. They shall be free of any painting, coating or covering.

You shall be able to connect and disconnect the CTs without using any tools except an adjustable or socket type spanner.

2.14.14 Cubicle Switchboard enclosed Current Transformers

The following additional requirements apply when CTs are installed in a cubicle type switchboard.

The switchboard manufacturer should submit drawings to the MP including the location of metering CTs. The equipment shall be readily accessible from the outside of the cubicle.

Connections to the:

- (a) CT secondary terminals,
- (b) voltage circuit fuses, and
- (c) meter neutral bar,

shall not be more than 300mm from the plane of the access panel or doorway.

The cubicle or section of the switchboard allocated for the MP's use shall be separated from the customer's portion of the switchboard by means of a suitable barrier(s).

No part of the electrical installation is permitted within or on the MP's section of the switchboard except as permitted in clause 2.14.3.

Access arrangements shall also comply with clause 2.2.

2.14.15 Metering Panel Location and Access for Current Transformer Metering

The customer shall provide and arrange for a hinged meter panel to be installed where CT metering is required. The meters and their associated equipment for each separately metered part of the installation shall be kept together.

Locate the meter panel so that:

- (a) the height of the top edge of the meter is not more than 2000mm above the ground, floor, or platform, and
- (b) the bottom of the lowest part of metering equipment is at least 500mm above the ground, floor, or platform.

A minimum clearance of 175mm from the face of the hinged panel to the inside face of any enclosure shall be provided.

A minimum distance of 200mm from the face of the panel to any fixed object when the panel is open 90 degrees on its hinges shall be provided.

The metering panel shall not be installed in a location subject to high intensity magnetic fields.

The requirements set out in Section 2 for metering equipment will also apply to the installation, grouping, accessibility, location, and protection of CT meter equipment and meter panel.

2.14.16 Current Transformer Meter Panel

The customer shall provide a meter panel, 550mm X 550mm or greater for each metering installation (which includes check metering when required).

The panel shall:

- (a) be of suitable insulating material,
- (b) be double hinged on the left or right-hand side,
- (c) be mounted on a surround made of 1mm (min) zinc coated steel to provide a clear depth of 75mm (min) behind the panel, and
- (d) only have CT metering and associated equipment on the panel for one metering installation / National Metering Identifier (NMI) only.

The panel may form part of the main switchboard.

Any door fitted to a metering enclosure shall be labelled "Electricity Meters".

2.14.17 Facilities for Connection of Current Transformer Metering Equipment

Figure 2.4 shows a typical wiring diagram for CT metering.

The customer shall provide and arrange for the installation of all wiring necessary between the CT position and the CT meter for each separately metered part of the installation. Sufficient length to make the connections to the meters shall be provided.

The wiring shall be 0.6/1 kV, PVC insulated, stranded copper conductor of cross-sectional area as shown in Table 2-6. Each of the insulated conductors shall be visually distinguishable by size or colour and/or number marked on the insulation at regular intervals throughout its length. Refer to Table 2-6.

Sheathing of the voltage and CT secondary cables is required by AS/NZS 3000 and AS/NZS 3808 Insulating and Sheathing Materials for Electric Cables. Clear PVC tubing with a wall thickness of 1.5mm may be used to make the identification visible.

The conductors shall be:

- (a) single insulated conductors enclosed in conduit, or
- (b) multi-core sheathed cables, and
- (c) A single continual conductor between terminal connections.

Do not include any wiring for purposes other than the current and voltage circuit wiring in the conduit or sheath protecting this wiring, with the exception of the earth conductor for earthing the meter enclosure.

2.14.18 Protective Enclosure

Wherever possible, the protective enclosure for the voltage and current circuit wiring should be:

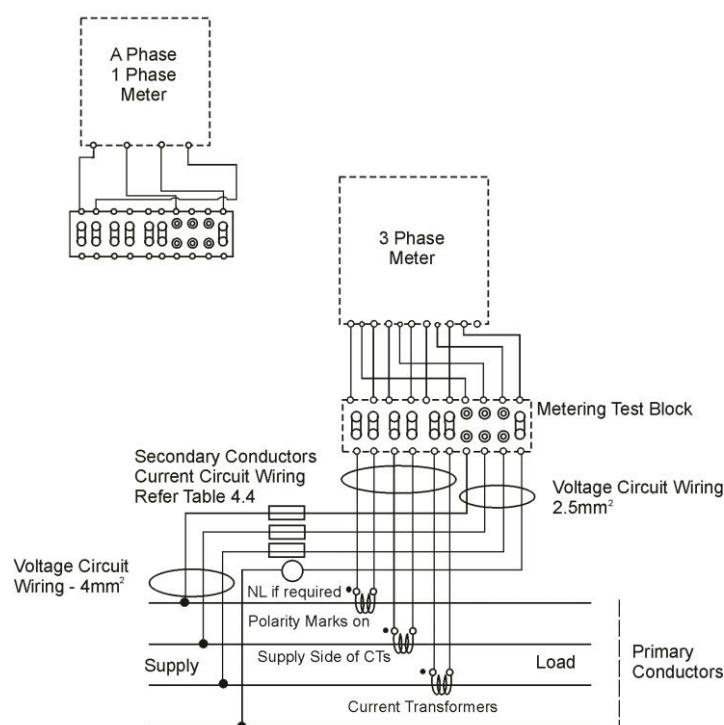
- (a) a surface-run PVC conduit, or
- (b) the plastic sheath of multicore cable.

The conduit or sheath shall be installed in accordance with AS/NZS 3000.

Where installed underground, the conduit shall be laid in accordance with the minimum depth of cover requirements of AS/NZS 3000 for underground wiring systems.

Figure 2-4 Typical Wiring for Current Transformer Metering

Three Single Phase Meter Installation
with A Phase Meter only shown for clarity

**Table 2-6 Identification Coding of Cabling for CT Metering**

Use	Size	Circuit	Identification Code		No. of Conductors	Installation
			Option 1 (Colour)	Option 2 (Numbering)		
Voltage Circuit (Fuse to Test Block to Meter)	2.5 mm ² (no limit on route length)	A phase B phase C phase Neutral	red white blue black	7 8 9 10	4 per CT metered position (includes a neutral)	Single cables in common conduit with current circuit cables or 1 multicore
Current Circuit (CTs to Test Block to Meter)	Refer to Table 2-7	A polarity A non-polarity B polarity B non-polarity C polarity C non-polarity	red black white orange blue grey	1 2 3 4 5 6	6 per CT metered position	Single cables in common conduit with voltage circuit cables or 1 multicore
Earthing	2.5 mm ² (no limit on route length)		Green/yellow	Green/yellow	1 per CT metered position	With voltage circuit or separately with cable run
Contactor Control Wiring	2.5 mm ²		red or black	red or black	1 per CT metered position	Twin cables in one sheath

Notes to Table 2-6:

1. Voltage circuit wiring in Figure 2-4
2. All cables shall have stranded copper conductors.
3. Where Option 1 identification code of cables is used the current circuit cable size cannot be the same as the voltage circuit.

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4. The voltage and secondary current circuits are to be numbered or colour coded throughout their entire length.
 5. Alternative colour identification is allowed provided cable identification chart is permanently located at the metering panel.

2.14.19 Current Circuit Wiring

The customer shall install six CT secondary current circuit conductors between the CTs and the meter panel (see Table 2-6).

The cross-sectional area required for the CT secondary circuit conductors is dependent upon:

- (a) the route length of the wiring between the meter panel and the CTs,
- (b) the transformer characteristics, and

shall be not less than that shown in Table 2-7.

Note: Existing 4 wire current circuit wiring systems do not require upgrading to a 6 wire system for a meter change in existing installations.

Table 2-7 Maximum route length of Current Circuit Wiring

Conductor csa (mm ²)	5VA Rated CT (m)	15VA rated CT (m)
2.5	6	18
4	10	30
6	15	44
10	25	75

* Consult the MP if the route length is likely to exceed these values.

2.14.20 Voltage Circuit Wiring

The customer shall provide the following facilities:

2.14.20.1 Primary Conductor to Fuse

A single core insulated and sheathed 4mm² cable shall be installed between each primary conductor and the voltage circuit fuses.

Sheathing may be achieved by using single core insulated cable enclosed in 6mm diameter clear PVC tubing with a wall thickness of 1.5mm.

The connection to the primary conductor shall be on the line side and as close as practicable to each current transformer. Refer to Figure 2-4.

The cables shall be:

- (a) no longer than 500mm,
- (b) connected to the voltage circuit fuses,
- (c) protected against mechanical damage, and
- (d) rigidly supported.

2.14.20.2 Fuse to Meter

Four voltage circuit conductors shall be installed, identified as per Table 2-6, from the voltage circuit fuses and the neutral bar to the meter panel.

2.14.20.3 Neutral Cable

The customer shall provide a connection facility for the metering neutral conductor. It shall be in a readily accessible location close to the CT position.

The connection facility may be:

- (a) a suitable tunnel terminal, or
- (b) a set screw in a neutral bar. The neutral bar may be the neutral conductor for the whole installation or for the portion of the installation being metered.

Alternatively, the connection facility may be in the form of a suitable neutral bar installed on the same panel as the voltage circuit fuses. It shall be connected by means of 2.5mm² cable to an approved neutral conductor as follows:

- (i) connect the neutral cable to a busbar using a suitable lug,
- (ii) secure the lug with a 6mm diameter set screw into a tapped hole or nut and bolt, and
- (iii) make the connection clearly visible from the position of the current transformers.

2.14.20.4 Sealing

Separate sealing facilities shall be provided for these connections if they are not contained within a sealed portion of the switchboard.

2.14.21 Meter Test Block

The customer shall provide and arrange for the installation of a meter test block at the meter panel.

The meter test block shall:

- (a) be front connected with a current, rating of 20A and a voltage rating of 660V,
- (b) provide for the connection of three-phase, three and four-wire meters,
- (c) comply with AS/NZS 3000,
- (d) provide for three current circuits, three voltage circuits and one neutral circuit,
- (e) be capable of accepting two external slide links and have the facility to short each current circuit,
- (f) be fitted with a slide link and two insulated nuts for each voltage circuit,
- (g) have a solid bar without slide link for the neutral circuit,
- (h) have provision for the insertion of auxiliary instruments in the current, voltage and neutral circuits with the aid of 4mm diameter test plugs, and
- (i) have a transparent sealable insulated cover that when in position no conductor or any mounting screw is exposed.

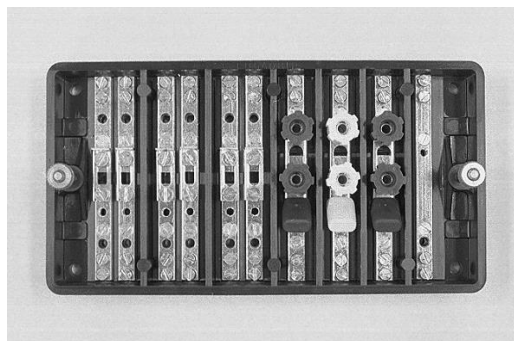
A meter test block which meets the ESAA pattern will meet with the above specifications.

The meter test block shall be located at the front of the panel and installed such that:

-
- (i) the voltage slide link will fall to the open position if released, and
 - (ii) the current slide link will fall to the closed position if released.

The connection of the current circuit and voltage circuit wiring to the meter test block are to be completed as per the requirements of the MP.

Figure 2-5 Example of a Meter Test Block



2.14.22 Load Control Device and Contactor Wiring

If you provide a contactor in accordance with clause 2.14.23, you shall install a pair of 2.5mm² cables between the CT metering panel and the contactor. The contactor installation shall meet the following requirements:

- (a) the contactor shall comply with the requirements of clause 2.10,
- (b) it shall be controlled and protected by a suitably rated 10A circuit breaker, both of which have provision for sealing, and
- (c) the pair of cables for the contactor may be grouped with other metering cables provided they are visually distinguishable from them.

2.14.23 Controlled Load for Current Transformer Metering

The customer shall supply and arrange to have installed a contactor for use if electricity is to be supplied (in accordance with the provisions of a tariff) to a CT metered portion of an installation only during certain hours.

The contactor shall be arranged so that it is operated by the electricity distributor's nominated load control device. The contactor shall be of a type approved by the electricity distributor and have:

- (a) the terminals and mechanism enclosed in a manner which facilitates sealing, and
- (b) a 240-volt operating coil and be designed to close and open simultaneously with the load control device.

The contactor shall be installed at the meter position or, alternatively, adjacent to the controlled load current transformers.

2.14.24 Earthing of Meter Surround

The customer shall arrange for the connection an earthing conductor to the metal surround of the meter panel in accordance with the provisions of AS/NZS 3000.

2.14.25 Communications Equipment for Current Transformer Metering

Where National Electricity Rules compliant CT metering is installed, unmetered supply may be taken for rule compliant data and communications equipment only. This equipment shall be connected to a sealable bar on the load side of the meter test block (between the test block and the meter).

Where rule compliant whole current metering is installed, metered supply shall be taken for rule compliant data and communications equipment. This equipment shall be connected to a metered bar on the line side of the main switch.

Communications which require mains supply equipment shall be protected by a sealable current limiting (HRC) fuse or circuit breaker with a maximum rated current of 6A (to grade with the 10A current limiting (HRC) meter potential fuse, where CT metering is installed). This equipment does not need to be controlled by a separate main switch and shall be hard wired to the supply (socket outlets are not permitted).

Alternatively, communications equipment integrated in the meter may obtain a protected supply internally from the meter.

3 HIGH VOLTAGE METERING EQUIPMENT

3.1 General Requirements

The following high voltage (HV) metering requirements defines the electricity metering specifications for customers and their retailer/metering provider, wishing to connect to the distributor's network at high voltage.

Typical HV metering schematic general arrangements are shown in section 3.11.

The HV metering installation shall comply with the relevant parts of these MIRs, SIRs, AS/NZS 3000, AS 2067, National Electricity Rules and referenced AEMO procedures.

The customer shall provide and arrange for the facilities for the installation and connection of the voltage metering and current metering transformers, meters and associated equipment in accordance with the requirements of these rules and the MP.

The customer's retailer is responsible for ensuring that there is a valid National Metering Identifier (NMI) for the connection point.

The customer is responsible for ensuring that the ratings and specification of all equipment installed on site are suitable for the intended purpose and that a retailer and MC have been engaged for the metering installation.

The customer is also responsible for the providing and arranging for the installation of:

- (a) all equipment, mounting facilities and enclosures for meters and associated communication equipment,
- (b) meter panels,
- (c) voltage circuit fuses suitable for sealing,
- (d) all cabling to the specified identification code fully connected to the equipment,
- (e) voltage transformers,
- (f) current transformers, and
- (g) a suitable meter test block.

Prior to procurement and installation, the MP and Distributor/Transmission shall be consulted in regard to the above specifications.

Note: To reduce the instances of communication faults due to out of service supply, consideration should be given to making available an independent auxiliary meter/communication power supply.

3.2 Location

HV metering equipment shall:

- (a) meet with the relevant requirements of Clause 2.2,
- (b) not be installed in unsuitable location as described in Clause 2.3,
- (c) be located on the customer's side of the connection point,
- (d) be as close as practical to the connection point,

- (e) be located in an area which ensures the accessibility of the MP to meet their obligations under the National Electricity Rules for testing of metering equipment and rectifying faults,
 - (f) not located within HV enclosures, where entry to the area requires the issue of an Electrical Access Authority,
 - (g) not form any part of the Regulated Asset i.e. cannot share CT and/or VT cores of a Distributor's primary equipment, and
 - (h) not be located on the Distributor's/Transmission's property.
-

3.3 Metering Transformer Compliance

All metering transformers shall comply with chapter 7 of the National Electricity Rules and the referenced AEMO Procedures and specifically AEMO Metrology Procedure Part A.

Metering CTs shall be solely for metering purposes and are not to be used for other purposes such as protection or load monitoring, unless approved by the MC.

Metering CTs whether single or multi tap and respective ratios shall be selected to, as a minimum, meet the maximum demand of the part of the electrical installation that it is metering. Consideration should also be given to possible change in future electrical loading.

Metering voltage transformers (VTs) shall be suitable for metering purposes and where shared for other purposes in a substation, have separately fused secondary circuits to ensure independence of metering circuits.

All VT's shall have a nominal secondary voltage rating of 110V line–line (3-phase VT) or $110/\sqrt{3}$ V phase–neutral, a minimum burden rating of 25VA (per phase for polyphase VT) and a minimum voltage factor of 1.9.

The metering transformers shall meet or exceed the following requirements:

- (a) Manufactured and tested in accordance with the requirements of the National Electricity Rules and the referenced AEMO Procedures.
- (b) Compliant with any applicable specification or guidelines specified by the National Measurement Institute under the National Measurement Act.
- (c) Class 0.5 for type 3 & type 4 installations (with consumption less than 100GWh per annum).
- (d) Class 0.5 Revenue and Class 1.0 Check for type 2 installations (between 100 and 1000GWh per annum).
- (e) Class 0.2 Revenue and Class 0.2 Check for type 1 installations (with consumption than 1000GWh per annum).

Note: Partial check metering is mandated for type 2 metering installations and full check metering is mandated for type 1 metering installations

- (f) Provided with a valid type test certificate for the relevant Australian Standard¹ as detailed in the AEMO Metrology Procedure Part A, issued by a NATA accredited laboratory, or a

¹ At time of printing, new CTs must meet the relevant requirements of AS 61869.1 (General Requirements) and AS 61869.2 (Current Transformer). New VTs must meet the relevant requirements of AS 61869.1 (General Requirements) and AS 61869.3 (Voltage Transformer) for single phase magnetic VT's, AS 61869.1 (General Requirements) and AS 61869.5 for Capacitor VT's, or AS 1243 for 3-phase VT's. New combined transformers must meet the relevant requirements of AS 61869.1 (General Requirements) and AS 61869.4 (Combined Transformers).

body recognised by the National Association of Testing Authorities (NATA) under the International Accreditation Cooperation (ILAC) mutual recognition scheme and a valid pattern approval issued under the authority of the National Measurement Institute when it becomes applicable.

- (g) Capable of having access covers to the secondary terminals sealed to prevent unauthorised access.

Notes:

1. It is recommended that accuracy class 0.2S/0.5S CTs respectively (rather than standard class 0.2/0.5) be selected, utilising 1-amp secondary windings, to allow for greater secondary circuit impedance without compromising overall error.
2. It is recommended that dual secondary winding VTs be utilised for type 1 and type 2 metering installations to achieve improved check metering objectives.

The provision of a valid Type Test Certificate and accuracy test report is required to be submitted to the MC and Distributor at least 30 business days prior to the commissioning of the HV supply.

The metering transformers shall also be supplied with an accuracy test report detailing individual phase and amplitude accuracy test results with the results traceable and sourced from a laboratory that is qualified under the ISO/IEC 17025 general requirements for the competence of testing and calibration laboratories and is accredited for that qualification by NATA or another accreditation body that is a signatory of the ILAC MRA or AEMO MP accredited for CT and VT testing, and to the measurement uncertainty requirements defined by the National Electricity Rules.

Further information can be gained from the MP.

3.4 Metering Transformer Arrangement

The following arrangements should be read in conjunction with section 3.10.

- (a) the metering transformers shall be located within a high voltage chamber or area to which security of access by only authorised personnel can be ensured,
- (b) the layout of the metering transformers shall be such that identification of the metering transformers polarities can be readily determined,
- (c) direct access to all secondary terminals of all metering transformers – or alternatively, where the secondary terminals are not accessible while in service, access to a suitable marshalling point as close as possible (electrically) to the secondary terminals - shall be readily available for the routine testing of the metering equipment,

Note: For example, where multi-tap CTs are utilised, all ratios shall be terminated at the marshalling point.

- (d) only metering equipment shall be located within the HV metering chamber,

Exception: Anti-condensation heaters may be installed within the HV metering chamber.

- (e) the metering voltage transformers shall be permanently mounted,
- (f) the secondary windings circuit of the VTs shall be fitted with a 32-amp HRC off set tag fuse bases, complying with AS 60269 at the metering transformer marshalling point detailed in Section 3.5,

- (g) the metering transformer primary terminals shall be connected immediately after and on the load side of the main incoming circuit breaker,
- (h) Provision shall be made to enable the application of short circuit and earthing of all high voltage conductors to facilitate safe work on the metering transformers,
- (i) Provision must be made to enable isolation from sources of supply, and access to the primary terminals of metering transformers for the purpose of connecting primary injection accuracy testing equipment, and
- (j) The nameplate details of each metering transformer shall be indelibly and legibly marked in a location where they are visible while the installation is in service. Where the metering transformers are installed within switchgear, duplicate nameplates shall be installed on the outside of the switchgear or at the metering position.

The MP may have additional requirements.

3.5 Metering Transformer Marshalling

In situations where access to the terminals of metering transformers is not readily accessible while the installation is in service, with consideration given to minimum safe working distances from in-service HV equipment, a suitable metering transformer marshalling point shall be provided.

The marshalling terminals shall be installed as close as practical to the location of the metering transformers and within 3 metres route length of the metering transformer secondary terminals or, immediately outside of the safe working distance limits for the voltage present.

The marshalling terminals shall be located where there is sufficient space to allow the easy termination of conductors and adequate space for the required secondary circuit cable/s with consideration to the minimum bending radius of these cables.

The metering transformer terminal box may be used as the marshalling point only if it is accessible while the equipment is in-service with consideration given to minimum safe working distances from in-service HV equipment.

Depending on the metering transformer type that will be marshalled within, the marshalling point shall be of adequate size to accommodate the following equipment:

VT Marshalling:

- 3 black HRC fuse holders or suitable miniature circuit breaker/s (MCB), e.g. Alstom Safeclip SC20H fuse holder or similar.
- 1 white, HRC fuse holder, e.g. Alstom Safeclip SC20HWH or similar.
- Duplication of the above where a check metering installation is required.
- Suitable terminals to terminate the VT secondary wiring which also allow provision for a test connection using a spade lug or 4mm test plug on each of the VT secondary circuit conductors without having to loosen or remove the permanent wiring termination.

Current transformer marshalling:

- Suitable terminals to terminate the metering CT secondary wiring which also allow provision for a test connection using a spade lug or 4mm test plug without having to loosen or remove the permanent wiring termination.

The CT and VT secondary circuits may be terminated in the same marshalling box or switchgear enclosure providing that there is adequate space for the equipment noted above.

The VT circuit protection fuses and bar within the marshalling box shall have the facility to be appropriately sealed by the Metering Provider to prevent unauthorised access.

All terminals shall have a cover that can be appropriately sealed by the Metering Provider to prevent unauthorised access.

An appropriately IP rated enclosure of suitable material shall be used for the marshalling enclosure. Consideration shall be given to weather, salt or dust laden air, corrosion, and vandalism. A minimum IP55 rated enclosure is recommended where the enclosure is installed outside.

The enclosure shall have an adequate number of conduit entry points that can accept the required secondary circuit cable/s.

All fuses and bars contained within the marshalling box/s shall be numbered and labelled appropriately. A corresponding function table with each item's function is to be laminated and attached to the rear of each marshalling box access door.

3.6 HV Metering Secondary Cabling

The customer shall provide and arrange for the installation of all wiring necessary between the metering transformers and the meter location. Sufficient length shall be provided to make the connections to the meters.

The wiring shall be 0.6/1 kV, PVC insulated, stranded copper conductor. Each of the insulated conductors shall be visually and uniquely distinguishable by size, colour and/or number marked on the insulation and at all terminations.

A schematic of the metering circuitry, including cabling identification utilised, shall be permanently provided at the metering point.

The conductors shall be:

- (a) single insulated conductors enclosed in conduit, or
- (b) multi-core sheathed cables.

The conduit or sheath protecting the metering transformer secondary cables shall only contain conductors for this purpose but can include an earth conductor.

Wherever possible, the protective enclosure for the metering transformers secondary cables wiring should be:

- (a) a surface-run PVC conduit, or
- (b) the PVC sheath of multicore cable.

The conduit or sheath shall be installed in accordance with AS/NZS 3000.

Where surface-run wiring is not practicable or additional protection is required the cable shall be installed in heavy duty UPVC conduit.

Where installed underground, the conduit shall be laid in accordance with the minimum depth of cover requirements of AS/NZS 3000 for underground wiring systems.

The cross-sectional area required for the metering transformer circuit conductors is dependent upon:

- (i) the route length of the wiring between the metering transformer and the meter panel, and
- (ii) the metering transformer characteristics.

It shall not be less than that shown in Table 3-1 for current transformer secondary wiring and Table 3-2 for voltage transformer secondary wiring.

Table 3-1 Maximum route length of current transformer secondary wiring (m)

Conductor csa mm ²	1A 5VA Rated CT	1A 15VA Rated CT	5A 5VA Rated CT	5A 15VA Rated CT
2.5	180	430	6	20
4	230	700	10	30
6	350	1050	15	45
10	590	1750	25	70
16	930	2800	40	110

Table 3-2 Maximum route length for voltage transformer secondary wiring (m)

Conductor csa mm ²	Length
2.5	105
4	170
6	255
10	425
16	680

3.7 HV Metering Panels

The customer shall provide and install a hinged meter panel where HV metering is required. The meters and their associated equipment for each separately metered part of the installation, at a single connection point, shall be kept together.

The customer shall provide a meter panel, 550mm X 550mm or greater for a single metering installation.

The panel shall:

- (a) be of suitable insulating material,
- (b) be doubled hinged on the left or right-hand side,
- (c) be mounted on a surround made of 1mm (min) zinc coated steel to provide a clear depth of 75mm (min) behind the panel, and
- (d) only HV metering and associated equipment is permitted on this panel.

Note: Revenue and check metering to be treated as separate metering installations for the purpose of the metering panel.

The meter panel shall be located such that:

- (i) the height of the top edge of the meter above the ground, floor or platform level is not more than 2000mm, and
- (ii) the bottom of the lowest part of metering equipment is at least 500mm above the ground, floor or platform.

A minimum clearance of 175mm shall be provided from the face of the hinged panel to the inside face of any enclosure.

A minimum distance of 200mm from the face of the panel to any fixed object when the panel is open 90 degrees on its hinges shall be provided.

The metering panel shall not be installed in a location subject to high intensity magnetic fields.

The requirements set out in the Section 2 for metering equipment will also apply to the installation, grouping, accessibility, location, and protection of HV meter equipment and meter panel.

The panel may form part of the main switchboard.

Any door fitted to a metering enclosure shall be labelled "Electricity Meters".

3.8 Test Block and Fuses

A test block shall be provided at the front of the meter panel. The test block shall have the following:

- (a) facilities for the bridging/shorting of the CT secondary circuits,
- (b) facilities for the isolation of secondary VT circuit at a fuse, if not accommodated elsewhere on the metering panel,
- (c) isolation and test links shall be of a slide type that allows for an isolation and test point for current circuits and voltage circuits,
- (d) test links shall contain sockets at the top and bottom of the link to allow for the insertion of a 4mm test plug,
- (e) the current circuit slide links shall be arranged that the slide link will fall to the closed position if released, and
- (f) a transparent, insulated cover that, when in position, leaves no single insulated conductor exposed and has a facility for sealing.

Fuses for the isolation of secondary VT circuits shall be:

- (i) 32-amp HRC off set tag fuse bases, compiling with AS 60269,
 - (ii) black in colour and containing an HRC fuse of maximum rating 10A for conductors above earth potential, and
 - (iii) white in colour and containing links for conductors at earth potential.
-

3.9 Metering Provider Required Information

The following information shall be provided to the MP prior to the installation of any HV metering equipment at the site.

- (a) The National Metering Identifier (NMI) for each connection point that requires a metering installation.
 - (b) The metering type (type 1 – 4) of each connection point as per Chapter 7 of the National Electricity Rules.
 - (c) Metering transformers nameplates details including rated burden, connected CT ratio, other available CT ratios, serial numbers.
 - (d) A single line diagram of the supply connection showing the location of the metering transformers.
 - (e) Detailed wiring schematics of all metering secondary circuits from the metering transformers to the meter.
 - (f) Copy of Type Test and routine accuracy test report for each metering transformer.
 - (g) Panel layout drawings showing location of metering bars and terminals contained on the metering panel(s) as required.
-

3.10 Metering Transformer Earthing

Metering transformer secondary circuits shall be referenced to earth.

The location of the earthing shall be at the marshalling point.

The absence of an earth reference may result in an electrostatic potential on the secondary circuits which could cause damage to connected equipment and would pose a hazard for personnel who may come into contact with the circuit.²

² Adapted from IEEE Std C57.13.3-2014, IEEE Guide for Grounding of Instrument Transformer Secondary Circuits and Cases

3.11 Typical HV Metering Schematic General Arrangements

Figure 3-1 Metering Arrangement with CTs and VT Star Point Earth (3 x single phase VTs)

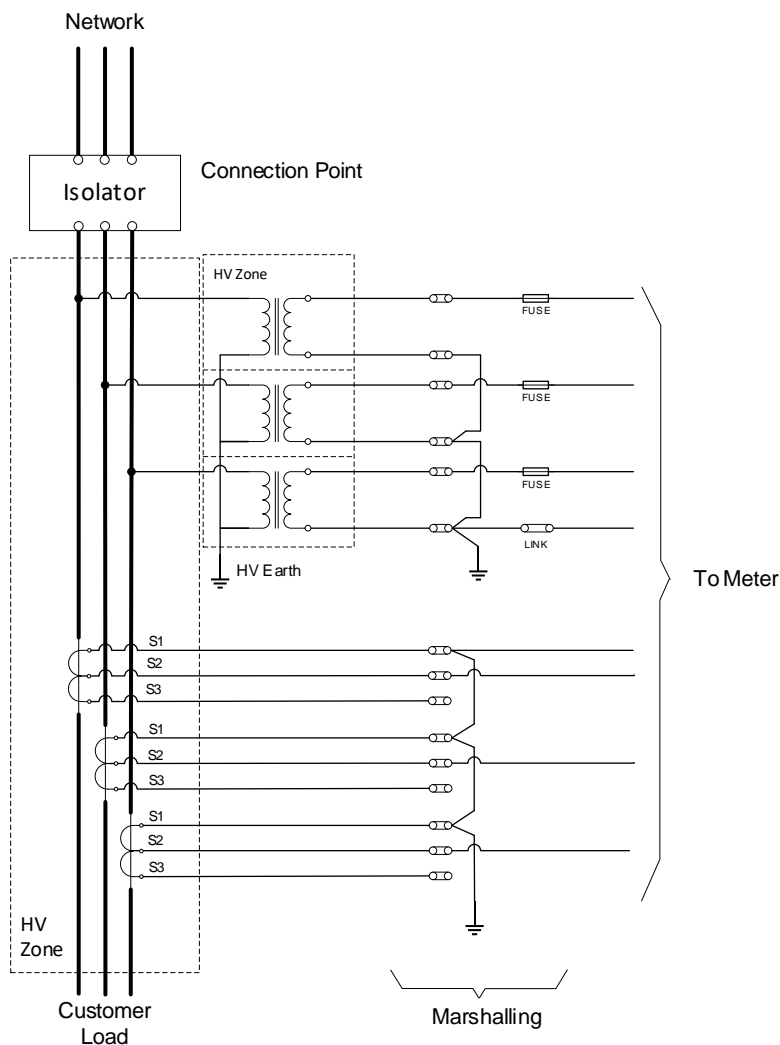


Figure 3-2 Y Star Point Earth (3-phase Cat B VT)

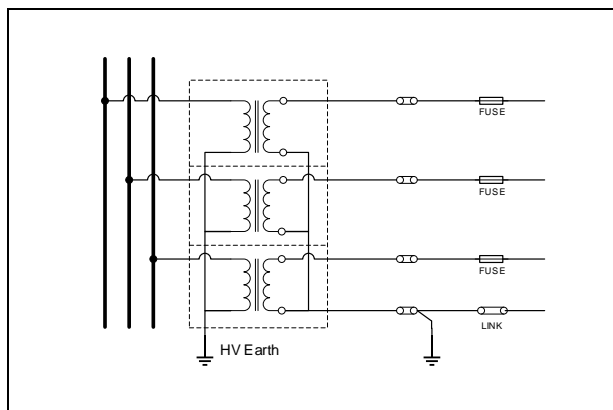
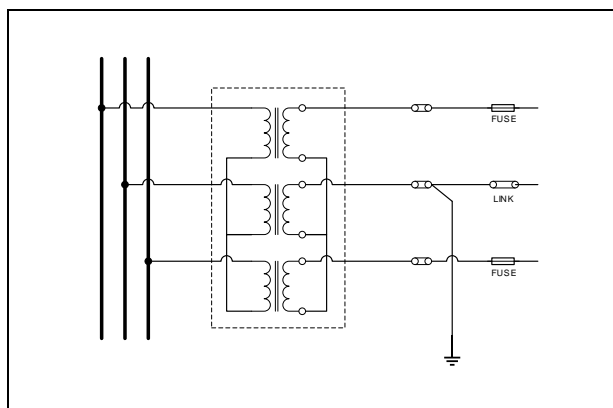


Figure 3-3 Z Reference Polarity Earth (3-phase Cat A VT)



4 EXISTING INSTALLATIONS

4.1 General

This section provides guidance and information for electrical installations which contain what was previously known as service equipment when electrical work is being undertaken on an existing installation. This equipment includes what was previously known as:

- Service Fuses
- Service Protection Devices (SPD)
- Combination Service Protection / Meter Protection Device (SPD/MPD)
- Service Neutral Link
- Service Active Link

Notes:

1. All equipment previously known as service equipment, not including service mains, is a part of the customer's electrical installation. Repair, replacement and/or maintenance of this equipment is the customer's responsibility.
2. Electricity Distributor owned metering and load control equipment is not a part of the customer's installation and is distributor owned and maintained equipment.

The requirements of this section are applicable for the repair and maintenance of existing previously known as service equipment only. Any addition or alteration shall be carried out in accordance with these MIRs.

4.2 Alteration of Labelling

When any metering work is being undertaken, the following equipment should be relabelled to meet with the requirements of these MIRs:

Old Marking	New Required Marking
SPD/MPD	MPD
Service Fuse	MPD, where applicable
Service Neutral Link	Supply Neutral Bar
Service Active Link	Unmetered Active Bar
Service Protection Device (Circuit Breaker)	Supply Protection Device
Metering Active Link	Metering Active Bar

Where possible and practicable, the old marking should be completely removed from the switchboard and/or panels.

Note: For the purpose of this clause, a Supply Protection Device means a device which provides some or all of the following:

- (a) over current protection for the consumers mains,
 - (b) short circuit protection for the main switchboard, and
 - (c) current limiting of the incoming electrical supply
-

4.3 MPD as Over Current Protection.

An existing MPD which is being utilised as an over current protection device for the consumers mains may remain as the over current protection device whilst the consumers mains remain at the existing size.

If the consumers mains are upgraded for any reason, then a separate over current protection device is required to be installed as per the requirements of AS/NZS 3000.

A MPD being utilised as an over current protection device may use a fuse cartridge with a rating less than 80 amps, to suit the current carrying capacity of the consumers mains.