

SCHEDULE "R"



Town of Cardston

Service and Metering Guide

Electrical Distribution System Operational Documents

Version 1.023



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Introduction

This publication is for use by Town of Cardston Customers and various groups concerned with Urban Residential, Multiple Residential, Rural Residential and One or Three Phase Commercial (see Glossary for definitions) electrical installations within the Town of Cardston's service area.

Customers should apply for service early in the planning stage of a project to help ensure that Cardston Electric Utility can meet the Customers project time schedule and to ensure the installation will be satisfactory to both the inspection authority and Cardston Electric Utility. Customers can arrange an inspection of an installation by contacting Cardston Electric Utility 403-653-5672.

This publication covers most of the possible Customer projects encountered on the Cardston Electric Utility's system. Customer projects that do not meet the requirements covered in this publication shall abide by "Non-Standard Services".

All Customer electrical equipment shall conform to CSA Standards. The Customer project shall comply with the Safety Codes Act, associated regulations and the Town of Cardston Customer Terms and Conditions. The Customer service entrance or switch-gear equipment will not be energized until its design, construction, location, and application are acceptable to both the inspection authority and Cardston Electric Utility.





1. GENERAL REQUIREMENTS

This section covers Cardston Electric Utility's general requirements, which shall be met before electrical service will be provided.

NOTE: If the service installation does not meet Cardston Electric Utility's or the governing authorities minimum requirements, any expenses incurred by the Cardston Electric Utility to bring the service up to code or to meet Cardston Electric Utility's requirements may be passed on to the Customer.

Non-Standard Services:

Whenever the requirements of this guide cannot be met:

- Submit equipment drawings, specifications and site plans to Cardston Electric Utility for approval before ordering and installing service entrance equipment or associated equipment.
- Drawings submitted shall clearly show all equipment related to the revenue metering, including service entrance equipment and revenue metering enclosures. These drawings should show elevations and enclosures sizes. In some cases, a hand drawn sketch that clearly shows the layout and dimensions is all that is needed.
- The Cardston Electric Utility will evaluate the submitted documents and issue a ruling on the non-standard service. An approval letter shall be received back before the service can be considered approved.
- In case of a dispute, Cardston Electric Utility staff will not honor verbal conversations', you shall have prints and/or a letter approved by Cardston Electric Utility to have your non-standard service energized. Any approval is only for the service in question and is not a general approval for future services.

Meeting Safety Codes Act and Associated Regulations:

The Cardston Electric Utility shall not connect or allow connection of an electrical Customer's service to the electrical utility system unless all the following criteria are met:

- The attachment point for conductors used on overhead systems to supply the Customer's service is located so that the conductors maintain required clearances.
- The metering equipment and location is acceptable.
- The Customer's service panel covers are in place.
- The Customer's service is grounded.
- The utility has received a copy of a valid permit issued by the inspection authority having jurisdiction.

Note: All covers for an electrical service entrance box are to be in place, so there are no energized exposed conductors, which could present a shock hazard.





Note: Refer to the Canadian Electrical Code - Section 10 for the requirements for grounding of a service.

Note: A valid permit only requires having the information that includes the Safety Codes Officer's name, the safety codes officer's designation number, and the agency to which he is employed with, including the applicable intended purpose, (i.e. "service connection").

CSA Approved Device / Meter Socket Requirements:

- Meter sockets are CSA approved devices. As such, any additions (i.e. isolated neutral blocks, additional lugs, etc.) to the meter socket shall be made with CSA approved kits, supplied by the manufacturer of the device/meter socket.

Electrical Equipment Rooms:

All electrical rooms in which Cardston Electric Utility's metering is installed in should be on ground level with outdoor access and shall comply with the following:

- Working Space - A minimum of 1 m working space by 2.2 m high is required in front of all electrical equipment and to the sides and back where access is required (additional requirements are listed in CEC Rule 2-308 and 2-312). Electrical rooms are not to be located in a bathroom, closet or stairway.
- Entrance/Exit - A minimum passageway of 1 m wide by 2.2 m high shall be maintained as an entrance or exit from all electrical areas. (additional requirements are listed in CEC Rule 2-310)
- Proximity to Other Equipment - It is not permissible to mount water, sewer, gas or other pipes or equipment foreign to the electrical installation directly above electrical equipment or to encroach on minimum working space around electrical equipment.
- Hazardous Locations - Electrical equipment cannot be located in areas that are hazardous to anyone working on electrical equipment or to the metering equipment itself. This would include moving machinery, dust, vibration, fumes, water, humidity and H₂S. This is also extended to areas where Cardston Electric Utility employees, contractors and vehicles may pose a hazard by transporting viruses or contaminants.
- Illumination and Ventilation - All electrical rooms or areas shall have adequate illumination and ventilation to carry out all work safely. (as per CEC 2-320 & 2-324)

Customer Instrumentation and Protection:

- Customer instrumentation including metering circuits, transfer relays, fire alarms, and step-down transformers shall be connected on the load side of the Cardston Electric Utility revenue metering. These Customer circuits cannot be connected into Cardston





Electric Utility revenue metering circuits and all equipment shall be mounted independent of the cabinets reserved for Cardston Electric Utility use.

- Instrumentation built into the main breaker, lightning arrestors and passive type surge suppressors are permitted to be located in the main breaker section of the Customer's switchgear and connected ahead of the Cardston Electric Utility metering.

Service Entrance Equipment Requirements:

All service entrance equipment shall comply with the following:

Conductors:

- All service entrances shall be designed and constructed such that metered and un-metered conductors are not run in the same conduit or raceway.

Equipment:

- All service entrance equipment requires hinged doors or cover plates over all live electrical equipment. If hinged doors are used, they shall open either left or right to not less than 110 degrees for outer doors and 90 degrees for inner doors. The only exception to the direction of opening is for horizontal mounted splitter boxes for which the doors would open downward.
- All hinged doors or cover plates that are ahead of the metering point require provisions for sealing screws. Barriers are required between all sections of the service entrance equipment, including metered and un-metered conductors and sections reserved for Customer use and those for Cardston Electric Utility's use.

Cardston Electric Utility Disconnect/Reconnect Procedures:

- The Cardston Electric Utility disconnect and reconnect procedures are intended to ensure all disconnections and reconnections of electrical service are completed in a safe manner by qualified personnel in accordance with all legal requirements and accepted industry practices. The procedures were developed in alignment with the Alberta Safety Codes Act Permit Regulation Section and the Alberta Electrical Utility Code.
- All disconnects and reconnects shall have prior approval of the Cardston Electric Utility.
- The disconnection and reconnection of an existing electrical service by a qualified electrician is limited to services not greater than 200 amp and 300 volts. The disconnection may be done at the meter or the weather head with prior approval by the Cardston Electric Utility.
- When the disconnection is completed by the electrician pulling the meter, he may be given permission by the Cardston Electric Utility to install the meter. When the disconnection is completed by cutting the hot wires at the weather head, the reconnection can only be completed by Cardston Electric Utility personnel.
- All other disconnects and reconnects shall be completed by Cardston Electric Utility personnel.

Modifications to Existing Services:





- Customers planning any of the following modification and or additions to their electrical system must comply with present day requirements.
- Increase in load (i.e. over load transformer)
- Increase in service conductor size (overhead or underground)
- Install back-up power supplies
- Install a transfer switch

Contact the Cardston Electric Utility (403-653-5672). The earliest contact with Cardston Electric Utility will help ensure that any additions or changes are installed correctly and safely, and they are satisfactory to both the inspection authority and Cardston Electric Utility.

Note: To ensure accuracy of metering installations, only contractors or utility staffs who are trained under federal regulations S-A-01 (Criteria for the Accreditation of Organizations to Perform Inspections Pursuant to the Electricity and Gas Inspection Act and the Weights and Measures Act) are authorized to install, remove, or handle meters. Any or all costs and/or damages associated with removal, installation, or handling of meters by unauthorized persons will be invoiced to the person(s) responsible.

Standard

Supply Voltages in Cardston

Service Voltage	Phase/Wire/Connection	Maximum Padmount Transformer	Maximum Overhead Transformer
120/240	Single-phase, 3 wire	167 KVA ***	75 KVA
240/480	Single-phase, 3 wire	50 KVA	100 KVA
120/208	Three-phase, 4 wire, star	1000 KVA	150 KVA
277/480	Three-phase, 4 wire, star	2000 KVA	N/A
347/600	Three-phase, 4 wire, star	2000 KVA	N/A

*** 100 KVA and over subject to approval

Customer owned Secondary Cable Voltage Drop Requirements:

- Customer service entrance conductors must be sized to limit the voltage drop between the points at which The Cardston Electric Utility makes its final connection to the customer’s conductors and to the line side of the Customer’s main service to a maximum of 3%.

Multiple Residential Services:

- All multiple residential services shall be designed and constructed for individually metered units/residences. Individual units will be on the Residential Rate CRD100 while common use areas such as hallway’s, lobbies and laundry rooms are metered and billed on the Small Commercial Rate CRD200.





Three-Phase Services:

- All three phase services should be four wire, grounded wye, with the grounded conductor run into the main breaker and bonded to the ground electrode. If indoor metering is installed then this grounded conductor (neutral reference) must be connected to the supply transformer Xo bushing (not ground bus or case ground) as this is a critical point for accurate metering. Any variation from this, will mean the service cannot be energized.
- With the grounded conductor grounded at the main service disconnect, all points beyond (down stream) of this, the neutral shall always be isolated from ground. The use of an isolated neutral block is necessary when the metering point (self-contained or instrument type) is on the load side of the main service disconnect.

Access to Metering Equipment:

- Cardston Electric Utility staff shall have reasonable access to all metering equipment for the purpose of changing, testing and reading.
- Where Cardston Electric Utility is not given ready access to the metering equipment due to locked doors, The Cardston Electric Utility may request a key for our use. A lock-box may be installed by Cardston Electric Utility for the purpose of keeping the key on site.
- The Cardston Electric Utility is absolved from all liability if the lock box is damaged or stolen.

Services That Do Not Require Metering:

- Cardston Electric Utility requires that most services be metered; however, there is an exception like existing Alberta Transportation lighting and Atco Gas rectifiers.

Determining Whether a Service needs to be Self-Contained or Instrument Metered:

- Self-Contained Metering:
 - The maximum limits for a self-contained meter is:
 - 200 amps per phase and/or
 - 600 volts phase to phase and/or
 - 130 HP motor or a continuous duty load at 480 volts phase to phase (CEC Rule 28-106 and 28-704)

Self-contained metering is to be used on all 200 amp services or less.

Note: If the service meets these requirements the Customer shall supply and install the metering according to Section Self-Contained Metering.

- If your service requirements are greater than the current, voltage or load limits given above, please refer to the Section Instrument Metering. Any service exceeding these requirements will need to be re-wired to instrument metering. Any service found to fall





within the instrument metering requirements guidelines must be re-wired to instrument metering at the Customer's expense or the service will be disconnected for safety reasons. Any requests for exceptions to these rules shall follow Section Non-Standard Services process outlined in this guide.

Instrument Metering:

- Instrument transformer type metering is required on all services exceeding 200 amps per phase and/or
- Exceeding 130 HP motor load at 480 volts phase to phase and/or
- If the phase-to-phase voltage exceeds 600 volts.
- For all services that require instrument type metering and are supplied from a dedicated padmount transformer, the metering will be installed by the Cardston Electric Utility, on the transformer. Instrument metering for all other configurations shall meet the requirements in this section.
- For services supplied from an overhead transformer the Customer shall install the metering according to the requirements in Instrument Transformer Metering.

Proximity of Customer Owned Equipment to Cardston Electric Utility Poles:

- Customer owned equipment is not allowed within a 5m radius of Cardston Electric Utility transformer or service poles.

Neutral Grounded Resistors (NGR):

- The Customer must advise the Cardston Electric Utility when considering the installation of an NGR. NGR'S are not permitted on services with self-contained meters. The customer shall provide the Cardston Electric Utility with the rating location of the grounding resistor.

2. METERING EQUIPMENT LOCATION & MOUNTING:

General Requirements:

- These requirements apply to the construction of all new installations and sites that the existing service drop is changed, or the meter socket is changed or relocated.
- The metering equipment must be:
 - Located not more than 30 m from the front property line or Cardston Electric Utility service transformer if it is on customer property.
 - Not recessed into walls, enclosed, boxed-in or otherwise obstructed so as to impede removal, reading, testing and/or re- installation of meters.
 - Not on or within a 5m radius of Cardston Electric Utility transformers or service poles
 - Level on both the horizontal and vertical planes.
 - Free of severe or continual vibration.





- In a clean and readily accessible area. Not in areas that are hazardous to anyone installing, working on or reading the metering equipment itself. Hazardous locations are defined as any area involving moving machinery, dust, vibration, fumes, water/moisture and H₂S.
- Not located in biologically hazardous areas such as livestock facilities. The Cardston Electric Utility metering shall be located far enough away from production areas so as to eliminate the danger of Cardston Electric Utility staff (meter readers, meter tech's and linemen) that shall visit the site from spreading any disease or virus.
- Upstream from any customer dry type step down transformers.
- In a location acceptable to the inspection authority and Cardston Electric Utility.

Note: Under no circumstances are meters to be installed in carports, breezeways or under sundecks or balconies on new installations, which could at some time be enclosed. If the area is enclosed at a later date, the Customer is responsible for all costs associated with relocating the meter to an accessible location.

Note: Any existing facilities that exist in the above mentioned areas including meters located inside buildings will need to be relocated as operationally needed at the discretion of the Cardston Electric Utility. The Customer will be responsible for all costs with relocating the meter to an accessible location.

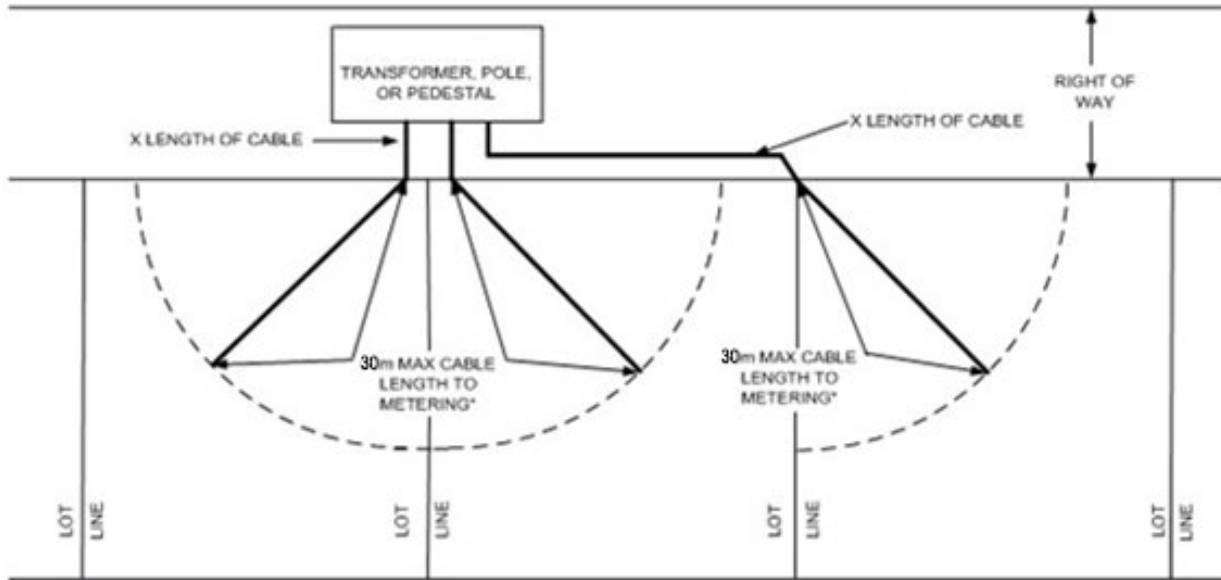
- For lots or acreages less than 0.33 acres (0.13 hectares) the underground and (or) overhead service drop length (total) must not be more than 30 m from the front property line or Cardston Electric Utility service transformer if it is on customer property. This shall not require more than 30 m of secondary conductor length.
- All residential services must have the metering located outdoors. When a meter is installed on a Customer-owned pole, the pole shall be provided and maintained by the Customer meeting all standards and regulations and should be a maximum of 7m from a driving surface to allow bucket truck access.
- Pole setting depth must be a minimum 10% of the height of the pole plus 2 feet.
- Cardston Electric Utility will supply and install up to 30m of overhead secondary wire and one pole to a customer-owned pole c/w meter socket, which is not more than 30m from the front property line.





Figure 1 - 30m Rule for All Services

Front Lot
Line



* An additional 5m of secondary cable is permitted to reach the height of any required connections.

Required

Equipment Mounting Heights Table 2.1

	Outdoor (Above Final Grade)	Indoor (Above Floor)
*Single Meter (Residential)	1.5 m (59") min. 1.8 m (71") max.	
*Single Meter (Commercial)	1.5 m (59") min. 1.8 m (71") max.	0.65 m (25.5") min. 1.8 m (71") max.
*Multiple Meters	1.5 m (59") min. 1.8 m (71") max. Duplexes / Fourplexes only	0.65 m (25.5") min. 1.8 m (71") max. Developments greater than 4 units only.
*Instrument Meter	1.5 m (59") min. 1.8 m (71") max.	1.0 m (39.5") min. 1.5 m (59") Standard 1.8 m (71") max.
Instrument / CT Cabinet	0.9 m (35.5") Cabinet bottom min. 2 m (79") Cabinet top max.	5 cm (2") Cabinet bottom min. 2 m (79") Cabinet top max.

* Measurements are to the center line of the meter





Single Meter Installations:

- These requirements apply to all self-contained metering installations.

Less than 300V Line-Line:

- The metering equipment for single urban/rural residential and single/three phase commercial services are required to meet the above general requirements in addition to the following:
 - Metering shall be located outdoors on either:
 - The outside wall of a house/suitable building located not more than 2m from the front corner of the house.
 - A separate suitable pedestal, such as a pressure treated 6"X6" post located a min. distance of 5m from the transformer pole or concrete pad.
 - Metering shall be connected on the line side of the Service disconnect.
 - Mounted with the center line of the meter at a height specified in (Table 2.1) The minimum height as specified must be maintained when a permanent structure such as a deck is built in the clear access area of the meter.

Greater than 300V Line-Line or Line-Neutral:

- The metering equipment for three phase or single phase commercial services are required to meet the above general requirements in addition to the following:
 - Located indoors; except for oilfield and irrigation services, where the meter may be located on the outside wall, directly opposite and connected downstream of the main breaker, or outdoors on a pole 5 m minimum away from the transformer pole
 - Connected on the load side of the service disconnect. For irrigation services, the distribution center for the motors shall be installed at the meter location, or an extra service disconnect is required on the load side of the meter.
 - Mounted with the center line of the meter at a height specified in Table 2.1 - Required Equipment Mounting Heights.
 - Equipped with provisions for Cardston Electric Utility to seal all service entrance equipment ahead of the revenue metering point.

Multiple Residential Services:

- The meters and equipment for multiple residential services are required to meet the above general requirements in addition to the following:
 - The meters are generally located indoors, grouped together in an approved location, and connected on the load side of the sub- service disconnect. The main switch, splitter box, and sub-service disconnects shall have provision for Cardston Electric Utility seals. All meter sockets shall be identified by address or unit number with a permanent legible label on all meter sockets and all disconnects.
 - In the case of a duplex or a fourplex (4 or less units), the meters can be located outdoors and be connected on the line side of the service disconnect.





- Equipped must have provisions for Cardston Electric Utility to seal all service entrance equipment ahead of the metering point.

3. RESPONSIBILITIES FOR PERMANENT SERVICES

- The following services apply to this section: Urban Residential, Rural Residential, Multiple Residential, Farm and Single/Three Phase Commercial.

General Responsibilities:

- Customers shall adhere to all relevant sections contained within this publication.
- For rural residential Customers, pole metering using a farm meter box will not be supplied or installed by Cardston Electric Utility. Please refer to section to section General Requirements.

Overhead Service Supplied by an Overhead Transformer Residential:

The Customer Shall:

- Provide a valid electrical permit.
- Supply/install the meter socket.
- Supply/install a metallic service entrance mast complete with weather head, clevis insulator and cable. The service mast or clevis insulator complete with bolt, shall be securely fastened to the building.

Note: Screw type insulators (service knobs) will not be accepted on new or upgraded construction.

The Cardston Electric Utility Shall:

- Supply, install the meter.
- Supply, install up to 30 m of secondary cable with any one span being a maximum of 30 m and 1 secondary pole if required.
- Own and maintain all conductors and Facilities required for an electrical supply service up to the line side of the final connection at the Customer owned service entrance conductors.

Underground Service Supplied by an Overhead Transformer Residential:

The Customer Shall:

- Supply/install the meter socket.
- Provide a valid electrical permit.
- Supply/install the service entrance conduit.

Cardston Electric Utility Shall:

- Supply/install the meter.





- Supply/install conduit, standoff brackets and mounting hardware suitable for 2" and 4" conduit.
- Trench from the transformer to the connection point.
- Supply and install the cable.

Note: Cardston Electric Utility will own and maintain all conductors and facilities required for an electrical supply service up to the line side of the final connection at the Customer owned service entrance conductors.

Overhead Service Supplied by an Overhead Transformer Commercial:

The Customer Shall:

- Supply/install the meter socket.
- Provide a valid electrical permit.
- Supply/install a metallic service entrance mast complete with weather head, clevis insulator and cable. The service mast or clevis insulator complete with bolt, shall be securely fastened to the building.

Note: Screw type insulators (service knobs) will not be accepted on new or upgraded construction.

Cardston Electric Utility Shall:

- Supply/install the meter.
- Supply/install up to 30 m of secondary cable with any one span being a maximum of 30 m and 1 secondary pole if required.

Note: Cardston Electric Utility will own and maintain all conductors and facilities required for an electrical supply service up to the line side of the final connection at the Customer owned service entrance conductors.

Underground Service Supplied by an Overhead Transformer Commercial:

The Customer Shall:

- Supply/install the meter socket.
- Supply/install the service entrance conduit).
- Provide a valid electrical permit.
- Supply adequate cable to reach the connection point of the overhead transformer.
- Trench from the transformer to the connection point.

Note: If the customer chooses to use multi conductor armored cable then the last 2 m of the cable must be stripped of the cable armor exposing the PVC inner jacket. The PVC jacket shall then be covered with color coded heat shrink tubing. The conductor intended to be used as the neutral shall be clearly identifiable via color coded white vinyl tape or heat shrink tubing.





Warning: the PVC color coded insulation used for TECK 90 (copper) cables is not suitable for UV exposure and will deteriorate over time breaking down the insulation and exposing the conductor.

No person except Cardston Electric Utility personnel shall climb the transformer pole. Cardston Electric Utility shall complete the final transformer connection.

Cardston Electric Utility shall:

- Supply/install the meter.
- Supply/install conduit, standoff brackets and mounting hardware suitable for 2" and 4" conduit.
- Connect the underground cable to the transformer secondary terminals.

Note: Cardston Electric Utility will own and maintain all conductors and facilities required for an electrical supply service up to the line side of the final connection at the Customer owned service entrance conductors.

Underground Service Supplied by a Padmount Transformer:

Residential:

The Customer shall:

- Supply/install the meter socket.
- Supply/install the service entrance conduit.
- Provide a valid electrical permit.

Cardston Electric Utility shall:

- Supply/install the meter.
- Trench from the transformer to the connection point.
- Supply and install the cable.

Note: Cardston Electric Utility will own and maintain all conductors and facilities required for an electrical supply service up to the line side of the final connection at the Customer owned service entrance conductors.

Commercial:

The Customer Shall:

- Supply, install the meter socket.
- Supply/install the service entrance conduit.
- Supply adequate cable to reach the connection point of the Padmount transformer.
- Supply mounting lugs for the transformer.

Cardston Electric Utility Shall:

- Supply, install the meter.
- Trench and install the supplied cable to the transformer.





- Issue a "Guarantee of Isolation" upon request.

Note: Cardston Electric Utility will own and maintain all conductors and facilities required for an electrical supply service up to the line side of the final connection at the Customer owned service entrance conductors.

4. TEMPORARY SERVICES

General requirements:

The Customer Shall:

- Supply/install the temporary pole or temporary stub to support the meter socket.
- Supply/install meter socket and the secondary protection including grounds.
- Provide a valid electrical permit.

Note: These requirements are in addition to the standard requirements for each type of service.

Overhead Service Supplied by an Overhead Transformer:

The Customer Shall:

- Supply, install and maintain the temporary pole.

Cardston Electric Utility shall:

- Supply/install the meter.
- Supply, install up to 30 m of secondary cable with any one span being a maximum of 30 m and 1 secondary pole if required.

Note: Cardston Electric Utility will own and maintain all conductors and facilities required for an electrical supply service up to the line side of the final connection at the Customer owned service entrance conductors.

Underground Service Supplied by an Overhead Transformer:

The Customer Shall:

- Supply, install and maintain the temporary stub pole.
- Supply and maintain the underground service entrance cable from the temporary stub pole to the supply service transformer pole.
- Supply/ install the meter socket.

Cardston Electric Utility Shall:

- Supply/ install the meter.
- Trench and install the supplied cable to the service transformer pole.





- Supply/install conduit, standoff brackets and mounting hardware suitable for 2" and 4" conduit.
- Connect the underground cable to the transformer secondary terminals.

Note: Cardston Electric Utility will own and maintain all conductors and facilities required for an electrical supply service up to the line side of the final connection at the Customer owned service entrance conductors.

5. Micro-Generation

The Customer shall contact the Cardston Electric Utility to begin the process and follow the following:

- Alberta Utilities Commission Micro-Generator Application Guide, in order to complete the required steps for the application of service.
- Cardston Electric Utility shall either approve or reject the Customer application based upon the service qualifying as a Micro-Generator under Alberta Utilities Commission Rule 024.
- The Customer must comply with Cardston Electric Utility technical interconnection requirements for a Distributed Energy Resource.
- For new services, the Customer shall supply and install their service equipment according to all relevant sections of this publication. For existing services, the Customer is not required to make any modification to their metering equipment.
- Once the service is approved as a Micro-Generator, Cardston Electric Utility shall supply and install a bi-directional meter to measure service load and export power.

Figure 2 - Typical SLD for a Micro-Generation Site

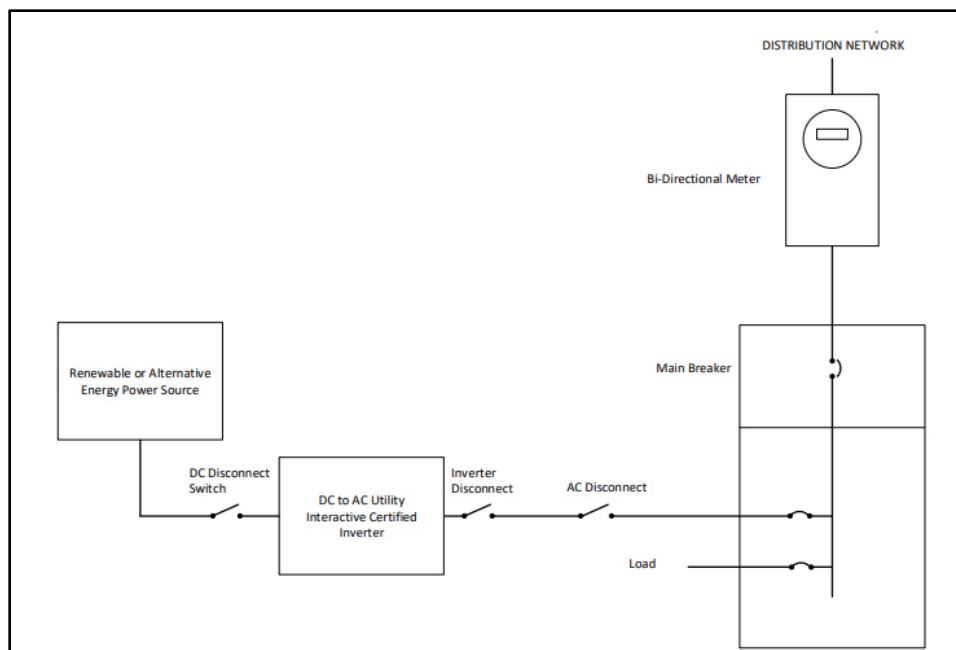
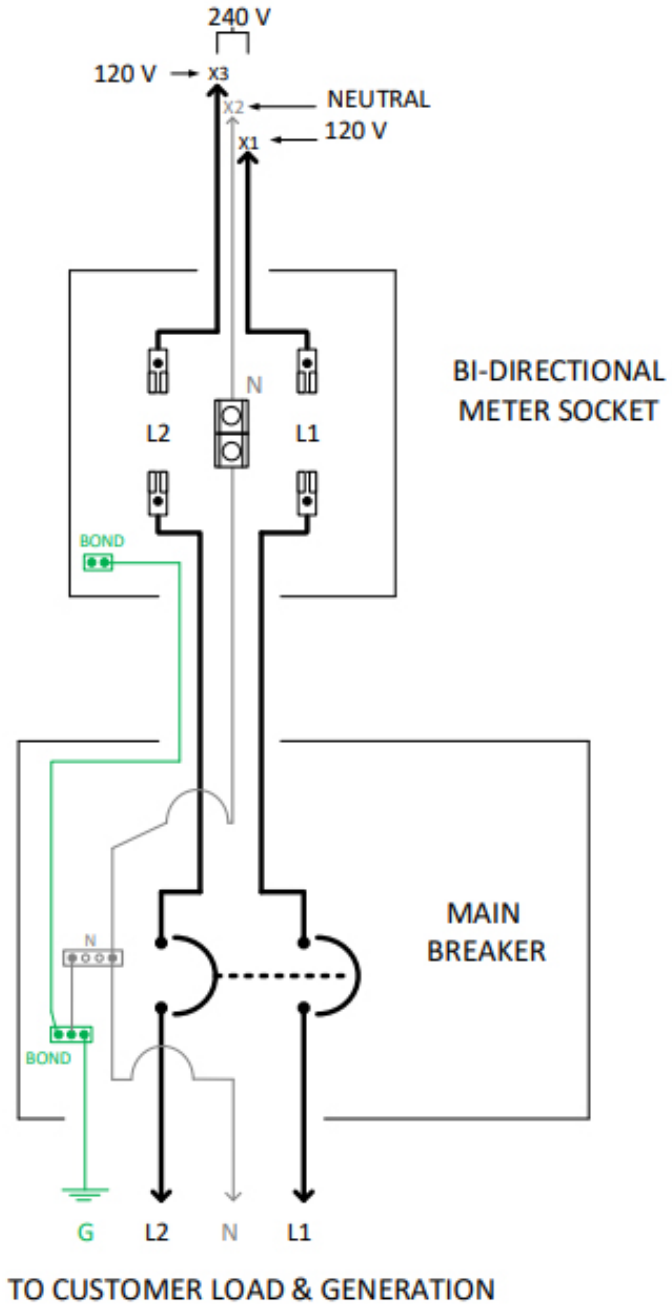


Figure 3 - 120/240 V, 3-Wire Single Phase Micro-Generation Meter Socket Connections



Note: The meter socket must be grounded





6. SELF-CONTAINED METERING

Maximum Limits for Self-Contained Metering

- 200 amps per phase and/or
- 600 volts per phase and/or
- 130 HP continuous duty motor load at 480 volts phase to phase (Canadian Electrical Code Rule 28-106 and 28-704)

Note: All Customers, including Micro-Generation Customers, connecting to Cardston Electric Utility’s distribution system shall have a maximum export output which will not exceed 170 amps (85% of 200 amps). Overload damages and repair costs to Cardston Electric Utility’s supply system shall be charged to the service account holder.

- Self-contained metering shall be used on all services wired for a 200 amp service or less.
- Junction boxes are not permitted ahead of the Cardston Electric Utility metering.
- If service requirements exceed the above maximum limits refer to section 7.0, Instrument Metering. Any service found exceeding the above maximum limits at any time shall be re wired to instrument metering at the Customers expense or the service will be disconnected.

Standard Self-Contained Socket Connections

Self-Contained Meters (Up to 200 AMPS)						
Voltage	Phase	Wire	Connection	Socket		Remarks
120	1	2		4 JAW	Figure 6.4.1	Neutral on right side of socket
120/240	1	3		4 JAW	Figure 6.4.2	
120/208	2	3	Network	5 JAW	Figure 6.4.3	5th jaw at 9 o'clock
120/208Y	3	4	Wye	7 JAW	Figure 6.4.4	
277/480Y	3	4	Wye	7 JAW	Figure 6.4.4	
347/600Y	3	4	Wye	7 JAW	Figure 6.4.4	

Supply of Self-Contained Metering Equipment:

- The Customer or his contractor is required to supply a meter socket complete with a screw type sealing ring for Cardston Electric Utility use that conforms to the latest edition of CSA Standard C22.2 No. 115, "Meter Mounting Devices". Sockets with current bypass switches will not be accepted.

Connection of Self-Contained Metering Equipment:

- The Customer is responsible to make all connections within the meter socket. The main service neutral shall be connected to the neutral socket lug within the meter socket.
- For single phase 240/480V services the meter socket shall be located after the main breaker and have the neutral brought in and isolated from its case. A bonding conductor must be brought in and connected to the meter enclosure.





- All neutral connections after the main service disconnect shall be isolated from ground (CEC Rule 10-208-d and 10-201). In the case of meter sockets located after the main disconnect an isolated neutral block/connector shall be used.

Meter Socket Connections for Self-Contained Metering Equipment:

Figure 4 -Single-Phase, Two Wire

120V 1P 2W

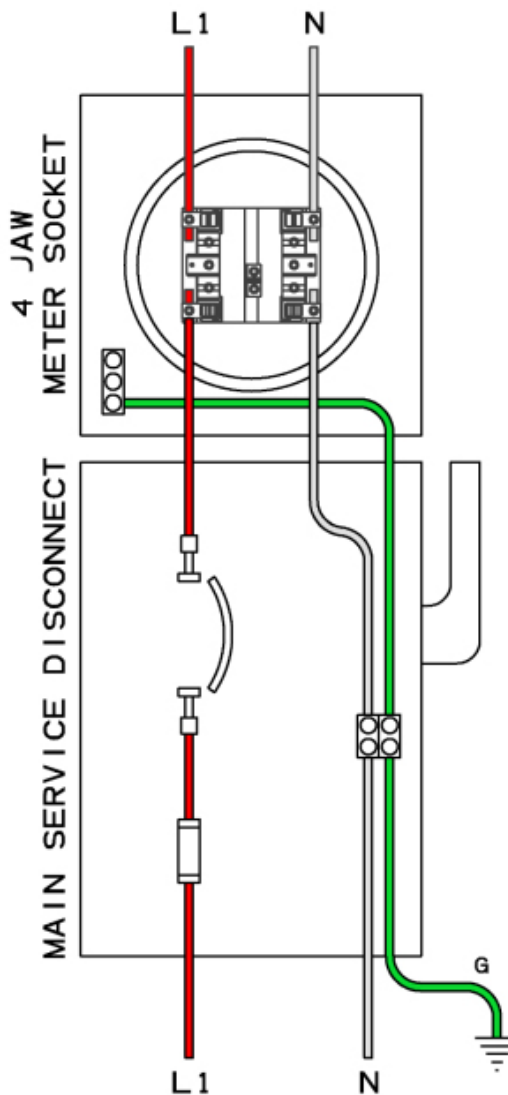


Figure 5 - Single-Phase, Three Wire Circuit, 120/240 Volts

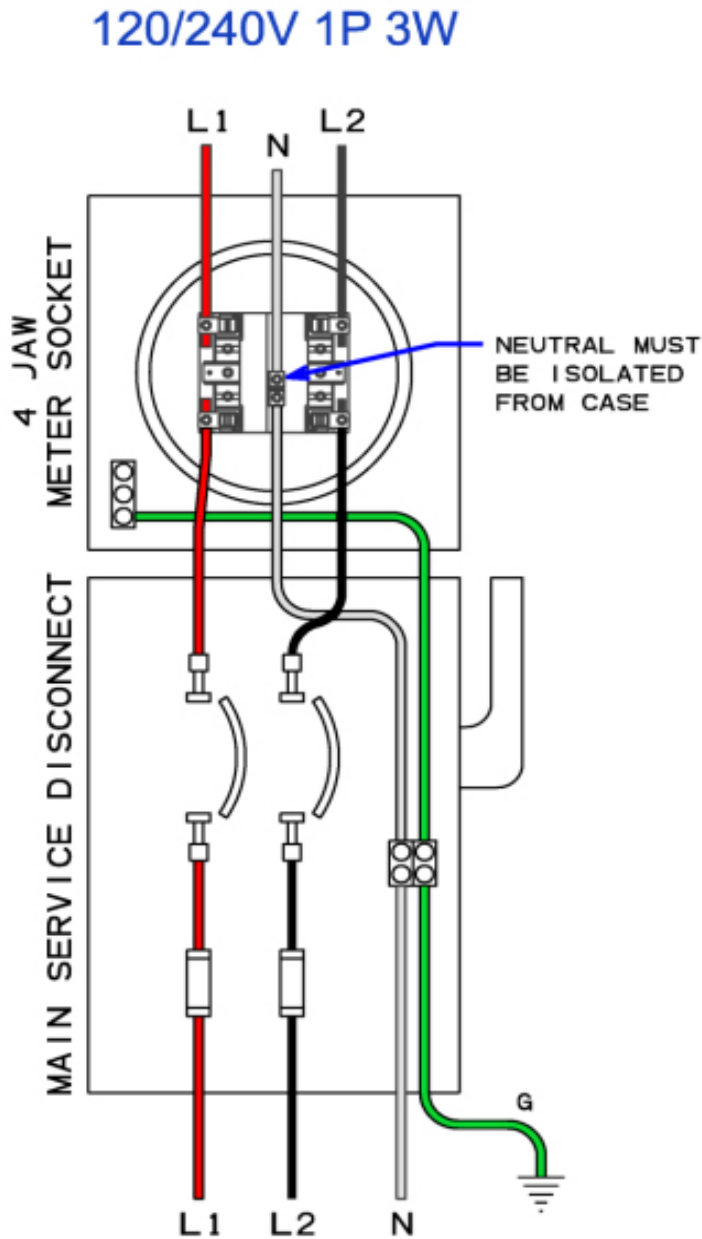
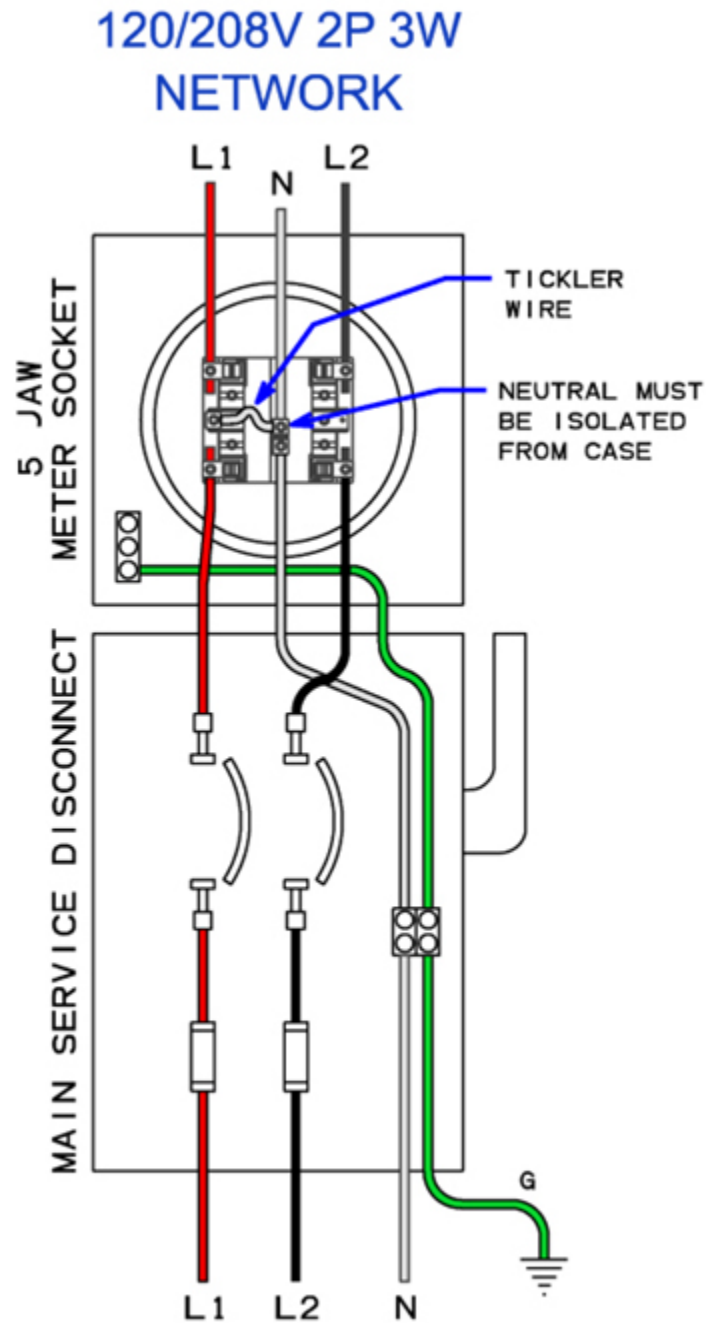




Figure 6 - Three-Wire, Network Circuit, 120/208 Volts

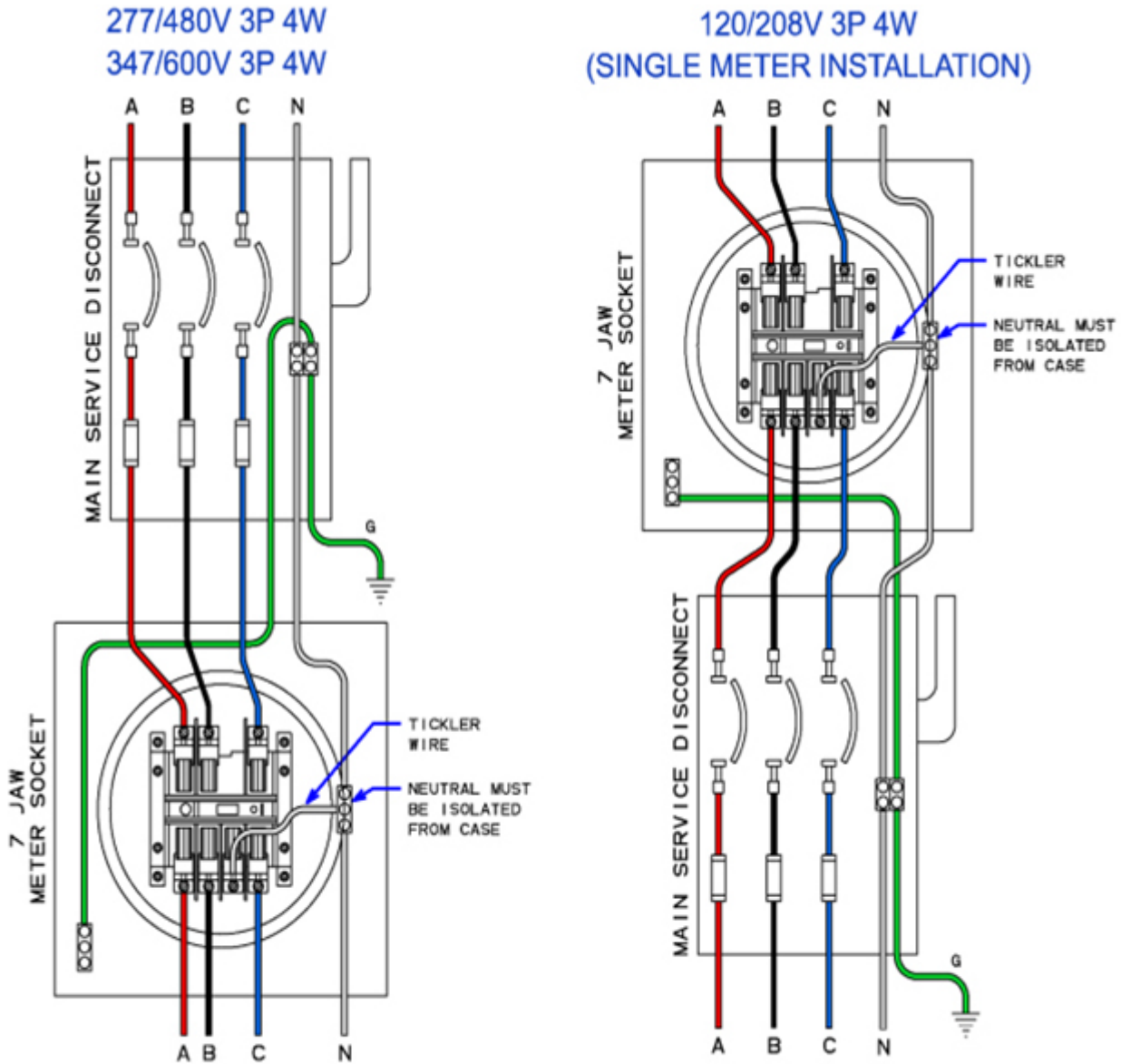


3-Wire, Network Circuit, 120/208 V Self Contained Meter Socket and Service Box Connection.





Figure 7 - Three-Phase, Four Wire WYE Circuit



Three Phase, 4-Wire, Circuit, 277/480 or 347/600 V (left), 120/208 V (right) Self Contained Meter and Service Box Connection



7. INSTRUMENT TRANSFORMER METERING

Instrument Transformer Type Metering is Required on all Services Exceeding:

- 200 amps per phase and/or
- 600volts phase to phase and/or,
- Exceeding 130HP continuous duty motor load at 480 volts phase to phase (CEC Rule 28-1.6 and 28-7.4).

Instrument Metering Requirements:

The Customer is required to supply:

- An approved instrument meter socket as specified below in Meter Socket / Specifications or combination unit.
- An instrument transformer enclosure according Required Instrument Transformer Enclosure Sizes.
- A 35 mm (1 ¼ ") conduit between the instrument transformer enclosure and the meter socket.
- All hardware, bus work, termination and/or cable required for primary connections to the current transformers.
- 19 mm (3/4") plywood behind all instrument transformer enclosures.

Cardston Electric Utility will supply:

- Revenue meter.
- Current transformer(s).
- Potential transformers (if applicable).
- Fuse blocks and fuses for the potential circuit

Note: The meter, fuses and fuse blocks will be the responsibility of Cardston Electric Utility personnel. CTs and meters remain the property of Cardston Electric Utility and the Customers shall provide Cardston Electric Utility with reasonable access to such equipment for meter reads and maintenance.

Commercial & Industrial Instrument Metering Equipment Location and Mounting Requirements

Both the instrument meter socket and instrument transformer enclosure must be located:

- Both indoors or both outdoors.
- In the same room (indoors).
- Within a maximum length of 7 m of 35mm (1 ¼ ") conduit between the meter socket and the instrument transformer enclosure.





The Customer is required to mount/install:

- An approved Instrument Metering socket (refer to, Instrument Meter Socket Specifications).
- An instrument transformer enclosure (refer to, Instrument Transformer Enclosures (Indoor),
- A conduit between the instrument transformer enclosure and meter socket/enclosure.

Cardston Electric Utility will:

- Mount the fuse block and fuses.
- Supply, install the current transformers.
- Supply/install the meter.
- Wire the instrument transformer secondary(s) to the meter and fuse blocks.

Note: The current transformers are to be mounted in the following manner:

- Screwed to the back panel of the instrument enclosure using #10 self-drilling - tapping screws. All four (4) mounting holes on the instrument transformer shall be utilized. So that the nameplates are clearly visible when the enclosure is open.
- Current transformers shall be positioned with the primary polarity mark toward the source of supply and in an arrangement that will not obstruct access to the secondary terminals.
- Current and potential transformers (if applicable) shall be installed in a manner that makes them accessible for easy removal.

Connections of Instrument Metering Equipment:

- For switchgear using bus bars, the neutral bus bar shall be run into the instrument transformer enclosure from the main service disconnect and have a hole tapped for a #10-32 screw, otherwise there shall be a 25 mm (1") wide by 6.3 mm (1/4") copper extension brought into the instrument transformer enclosure and have a hole tapped for a #10-32 screw.
- When insulated conductors are used instead of bus bars, an approved isolated neutral block shall be provided on one of the neutral conductor with in the instrument transformer enclosure and have a screw type connection for a #14 AWG potential wire for the metering.
- All three-phase services will be supplied as three phase, 4-wire solidly grounded-wye. The resulting requirement is that the ground conductor required by CEC Rule 10-210 [B1] shall be run from the Xo bushing of the supply transformer, to the bonding point of the main service disconnect. An insulated conductor of minimum size of #6 AWG is to be run from the bonding terminal block to an isolated neutral block in the instrument transformer enclosure. The conductor to the instrument transformer enclosure shall be coded white to indicate the neutral reference for the metering.





Instrument Meter Socket/Enclosure Grounding:

- Each meter socket shall be grounded to the system ground.

Conduit requirements:

- A metal conduit, 35mm (1 ¼”) diameter and a maximum length of 7 m is required between the instrument transformer enclosure and meter socket. This conduit shall be terminated with lock nuts and bushings except where thread hubs are supplied. If L.B.'s or similar conduit fittings shall be used, they shall be seal-able and clearly visible.
- The conduit is for exclusive use of the Cardston Electric Utility. When it is necessary to route revenue metering secondary wires through compartments other than those reserved for Cardston Electric Utility use, a metal conduit shall be passed through each compartment.

Instrument Metering Equipment Specifications:

Only Cardston Electric Utility approved instrument meter sockets are to be used. Currently approved sockets are:

Single Phase 51Hx31W cm (20Hx12W) in	120/240 240/480	3 Wire	6 Jaw c/w Test Switch	Thomas & Betts	Cat. # CT106- SWL
				Meter Device	Cat. # 602- C3040C6-953
Single Phase Residential 201-400A 111Hx33.8W cm (44Hx13W)in [Note: Service drop 60m or less in length]	120/240	3 wire	6 Jaw c/w Test Switch & CT compartment	Thomas & Betts	Cat. # FA4B-6T
Three Phase 51Hx31W cm (20Hx12W)) in	120/208, 277/480, 347/600, Over 600	4 Wire, Wye	13 Jaw c/w Test Switch	Thomas & Betts	Cat. # CT113-SWL
				Meter Device	Cat. # 602- C3040C-13-603





Instrument Transformer Enclosures (Indoor)

- Mounted so the bottom of the enclosure is 5 cm (2") minimum above the floor and or with a minimum separation of 5 cm (2") vertical between cabinets.
- Mounted so the top of the enclosure is a maximum of 2 m (78") above the floor

Instrument Transformer Enclosures (Outdoor)

- Mounted so the bottom of the enclosure is 0.9 m (36") minimum above the final grade.
- Mounted so the top of the enclosure is a maximum of 2 m (78") above the final grade.
- A separate instrument transformer enclosure is required for each instrument transformer service.

Instrument Transformer Cabinet Sizes

Type of Service ** Urban Residential **(meets distance rule) (2.1))			Service Size in Amps	Instrument Transformer Enclosure Size (mm/in.) Min. sizes				Current Transformers Supplied by Cardston Electric Utility	
Voltage	Phase	Wire		H	W	D	Gauge	Bar	Window
120/240	1	3	200-400	610 24"	610 24"	254 10"	16	2-2 Wire	
** 120/240	1	3	200-400	Part of FA4B-6T Microelectric socket			16	-	2
120/240	1	3	401-800	760 30"	760 30"	254 10"	16	2-2 Wire	
120/208Y	3	4	200-600	760 30"	760 30"	254 10"	16	3-2 Wire	
120/208Y	3	4	601-1500	Panel Board – (bus bars only)				3-2 Wire	
277/480Y	3	4	200-600	760 30"	760 30"	254 10"	16	3-2 Wire	
277/480Y	3	4	601-1500	Panel Board – (bus bars only)				3-2 Wire	
347/600Y	3	4	200-600	760 30"	760 30"	254 10"	16	3-2 Wire	
347/600Y	3	4	601-1200	Panel Board – (bus bars only)				3-2 Wire	
347/600Y	3	4	1201-3000	Panel Board – (bus bars only)				-	3
Over 600 Volts Y	3	4	All	Panel Board – (bus bars only)				3-2 Wire	





Instrument transformer enclosure doors

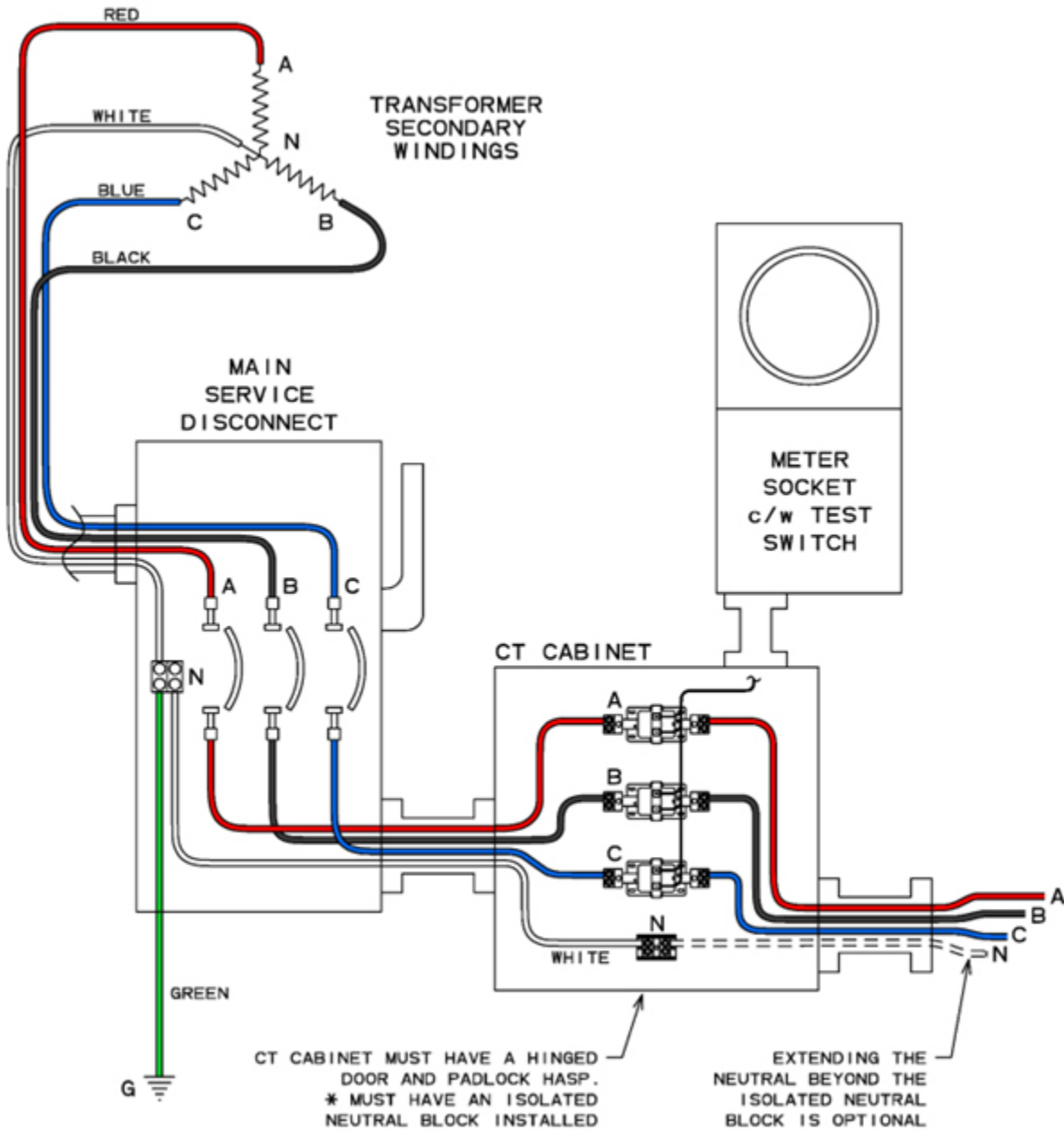
- The instrument transformer enclosure shall be equipped with vertically hinged door(s), which are non-removable in the closed position and equipped with stops to prevent the doors from accidentally dropping off the hinges in the open position.
- These door(s) shall be equipped with a latch and have provisions for securing the door with a Cardston Electric Utility padlock.

Cover plates

- Cover plates are not acceptable on instrument transformer cabinets.



Figure 8 - Instrument Transformer Metering Layout



3 Phase 4-Wire Y Instrument Metering Wiring Detail



8. GLOSSARY OF TERMS

- **Cardston Electric Utility** – Electrical Department owned by the Town of Cardston.
- **CEC** - Canadian Electrical Code, Part One (CSA Standard No. C22.1 - Latest Edition).
- **CSA** - Canadian Standards Association.
- **CT Cabinet** - The enclosure supplied and installed by the Customer for the housing of Cardston Electric Utility current transformers.
- **Distribution connection point** – An electrical line, at secondary or primary voltage (120V up to 25kV) which is used to serve multiple Customers.
- **Installed Capacity** - The rated capacity in kilo-volt-amperes (kVA) of the Cardston Electric Utility transformer supplying the service.
- **Instrument Transformers** - High accuracy current or voltage transformers approved by Measurement Canada for revenue metering.
- **Instrument Transformer Enclosure** - The enclosure supplied and installed by the Customer for the housing of instrument transformers.
- **Meter, Instrument Type** - A 20 Amp meter used in conjunction with instrument transformers (CT's & PT's).
- **Meter, Network** - A two element meter designed for use on a three wire network service obtained from two phase wires and a neutral of a three phase, four wire, wye system.
- **Meter Pedestal** - A meter mounting device that includes a meter socket and in some cases a breaker that is self-supporting.
- **Meter, Self-Contained** - A meter rated for carrying the total current and full voltage of the circuit to be metered.
- **Meter Socket** - A meter mounting device for the purpose of installing Cardston Electric Utility's self-contained 200 Amp meter or instrument 20 Amp meter.
- **Multiple Meter Installation** - Any installation where a building has several meters fed from one service entrance, such as apartment buildings, shopping centers, office buildings, warehouse or light industrial complexes.





- **Multiple Residential** - These services are generally single-phase 120/240volt or 120/208 volt self-contained services where a building has several meters supplied from a single service entrance. Multiple residential services include apartment buildings, condominium complexes.
- **Padmount Metering** – Metering configuration that is designed to be mounted onto the side of the secondary compartment of an underground transformer that sits on a precast pad or vault.
- **Rural Residential** – These services are generally single-phase 120/240 volt self-contained services to individual houses in a rural area or subdivision.
- **Service Disconnect /Main** - An approved metal box or cabinet containing either service fuses and a service switch or a circuit breaker and of such design that either the switch or circuit breaker may be manually operated when the box is closed.
- **Service Entrance** - means all that portion of the Customer's installation from the pedestal or its equivalent up to and including the point at which the supply authority makes connection.
- **Service, Temporary** - Service for a limited period of time (generally less than one year). (Example: construction sites).
- **Service, Three Phase/Four Wire** – All services are supplied as three phase conductors and a grounded neutral conductor to the service entrance, and
 - on to the metering
- **Single Phase Commercial** – These services are generally single phase 120/240 or three phase 120/208 volt self-contained services supplying typical businesses. This includes multi-family services with a commercial meter.
- **Three Phase Commercial** - These Commercial and Industrial services are three phase services, which may use 120/208 volt self-contained metering up to 347/600 Volt instrument metering typically supplying large Commercial Customers.
- **Urban Residential** – These services are generally single-phase 120/240 volt self-contained services to individual houses in an urban area.