

HYDRO ONE RETAIL METERING GUIDE
2024 EDITION



The Hydro One Retail Revenue Metering Standards Guide – 2024 Edition, provides direction for Customers, consultants, and electrical contractors modifying or installing an electrical service that will be energized by Hydro One. This Guide (as defined below) provides policies and specifications for retail metering configurations for low voltage electrical services from 120V up to 750V and medium voltage from 2.4kV up to 44kV.

This Guide is governed by, without limitation, applicable CSA/ULC Standards, the Electricity and Gas Inspection Act, the Electricity and Gas Inspection Regulations, the safety standards of Ontario Regulation 22/04: Electrical Distribution Safety and the Ontario Electrical Safety Code.

Hydro One does not assume any responsibility for the application of this Guide by anyone other than Hydro One staff or Hydro One authorized contractors.

Where the information in this Guide conflicts with any of the documents listed in Section 1.1 of this Guide, the documents in Section 1.1 shall take precedence.

NOTWITHSTANDING ANYTHING CONTAINED IN THIS GUIDE TO THE CONTRARY, NOTHING CONTAINED IN THIS GUIDE SHALL AFFECT IN ANY WAY WHATSOEVER THE RESPECTIVE LIABILITIES AND LIMITATIONS OF LIABILITY OF HYDRO ONE, AND THE CUSTOMER, THAT ARE SET OUT IN SECTION 1.9 OF THE CONDITIONS OF SERVICE.

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1. Introduction

1.1 Preface

This Guide is governed by:

- Hydro One's Conditions of Service.
- The Ontario Energy Board's Distribution System Code and Retail Settlement Code.
- The Ontario Electrical Safety Code.
- Ontario Regulation 22/04: Electrical Distribution Safety and Ontario Regulation 332/12: Building Code; and
- Electricity and Gas Inspection Act and Electricity and Gas Inspection Regulations.

Hydro One's services are subject to all laws and regulations that are applicable in its service territories. Where this Guide exceeds the requirements (i.e., allows greater flexibility) of the documents above, this Guide shall take precedence.

Note: Some of the requirements identified by the latest edition of the Ontario Electrical Safety Code have been included in this Guide for convenience and reference purposes only, even though they may be under the Electrical Safety Authority (ESA) jurisdiction.

1.2 Scope

This Guide applies to all existing, new, and upgraded retail Meter Installations and shall apply to all retail billed Customers, including Customers acquired through acquisitions.

1.3 Purpose

This Guide is intended for Hydro One Customers and their agents to provide the requirements for the design preparation, planning, and construction of, a proposed electrical service installation regarding retail revenue metering. The requirements apply to all existing, new, and upgraded services, both permanent and temporary, and are intended to provide an efficient and safe supply of electrical energy regarding retail revenue metering.

It shall be the responsibility of the Customer to conform to the latest editions of this Guide, the Conditions of Service, and all applicable laws and regulations including without limitation, the Ontario Electrical Safety Code.

The objective of this Guide is to help:

1. Ensure uniform safety requirements that comply with Hydro One Distribution Standards.
2. Provide uniform system reliability.

3. Support uniformity in installation practices.

1.4 Intent

The words “shall” or “will” indicate provisions that are mandatory.

The word “should” indicates provisions that are normally and generally practical for the specified conditions.

1.5 Compliance with Hydro One Rules

Hydro One reserves the right to refuse to energize the Customer’s Meter Installation if, in its sole discretion, it is deemed to not meet Hydro One’s requirements stated herein.

2. General Information

The following section outlines general requirements additional to the Hydro One Conditions of Service.

2.1 Application for New Connections or Upgrades

Load Customers requesting a service upgrade or a new connection may contact the Customer Communications Centre at 1-888-664-9376. Customer inquiries for new Net Generation projects or Load Displacement applications, including Backup Generators, may contact the DX Generation Department at 1-877-447-4412. Existing large contracts may contact the Business Customer Centre at 1-866-922-2466.

Application for service should be submitted early in the planning stage of the project for Hydro One to meet the Customer's needs, to determine the best service arrangement, and to obtain necessary equipment.

Note: Customers shall only be connected to the Hydro One distribution system when meeting Hydro One's retail metering requirements stated herein. There will be further non-metering requirements that are not covered in this guide and the Customer should refer to Hydro One's Conditions of Service for more information.

Before a service is connected, the Customer shall:

1. Complete an Early Consultation.
2. Obtain Consent prior to Installation.
3. Complete Construction.

2.1.1 Early Consultation

Hydro One requires information to prepare Meter Installation drawings and complete an electrical layout. For commercial and industrial Customers and residential Customers with service sizes above 400A, a New Customer Connection Information (NCCI) form must be completed.

2.1.2 Obtain Consent Prior to Installation

The Customer shall use equipment that meets the build and construction standards of Hydro One. For general requirements and examples of Meter-Mounting Devices (MMD) that meet Hydro One requirements, please refer to the [CSA-Approved Meter-Mounting Devices](#). If the Customer is procuring switchgear or switchboards as service entrance equipment, the Utility Metering Compartment (UMC) housing metering equipment, shall meet Hydro One requirements stated within this guide. In addition, these materials should be obtained in a timely fashion to

avoid any unnecessary delays. If primary metering is required, the Customer should co-ordinate in-service dates with Hydro One well in advance to ensure long lead-time equipment can be delivered on time. Work associated with the installation of equipment should start only after the metering design has been reviewed and accepted by Hydro One. Hydro One will provide Customers with an electrical service layout that refers to the Hydro One approved distribution standards and the installation shall be constructed to the defined standards. The electrical service layout provides details on how to construct the service connection and outlines Customer responsibilities.

2.1.3 Complete Construction

Where Hydro One requires the Customer to perform specific work on the Customer's premises, the Customer will do so as a prerequisite to Connection. For more information on approved construction standards refer to section on [Hydro One Distribution Standards](#).

2.1.4 Service Connection

After construction, and once ESA has provided connection authorization, Hydro One will connect the Customer's service on the condition that the installation meets Hydro One requirements.

2.2 Hydro One Distribution Standards

Hydro One uses standard materials and drawings to construct distribution systems. The focus of this document is on the metering installation portion of the distribution standards.

Hydro One provides access to these standards drawings and can be viewed on the external webpage: [Hydro One - Builders and Contractors Webpage](#).

Each Standard document available (the "Standard"), and all information and any other standards referenced or linked therein, is provided as a public service by Hydro One Networks Inc. ("Hydro One"). Information and material contained within the Standard carries no representation, warranty or guarantee of any kind, express or implied.

2.3 General Requirements

2.3.1 Metering Installation Accessibility

To facilitate the access and maintenance of Metering Installations by Hydro One employees, equipment shall be installed in a safe location subject to approval by Hydro One based on standards established by the OESC, the Conditions of Service, the Ontario Building Code, and the layout and/or subdivision design drawings.

2.3.1.1 Space & Access

Please see Space & Access in the [Hydro One Conditions of Service](#).

2.3.1.2 Meter Location

Please see Location of Metering Installations in the [Hydro One Conditions of Service](#).

Metering Installations shall:

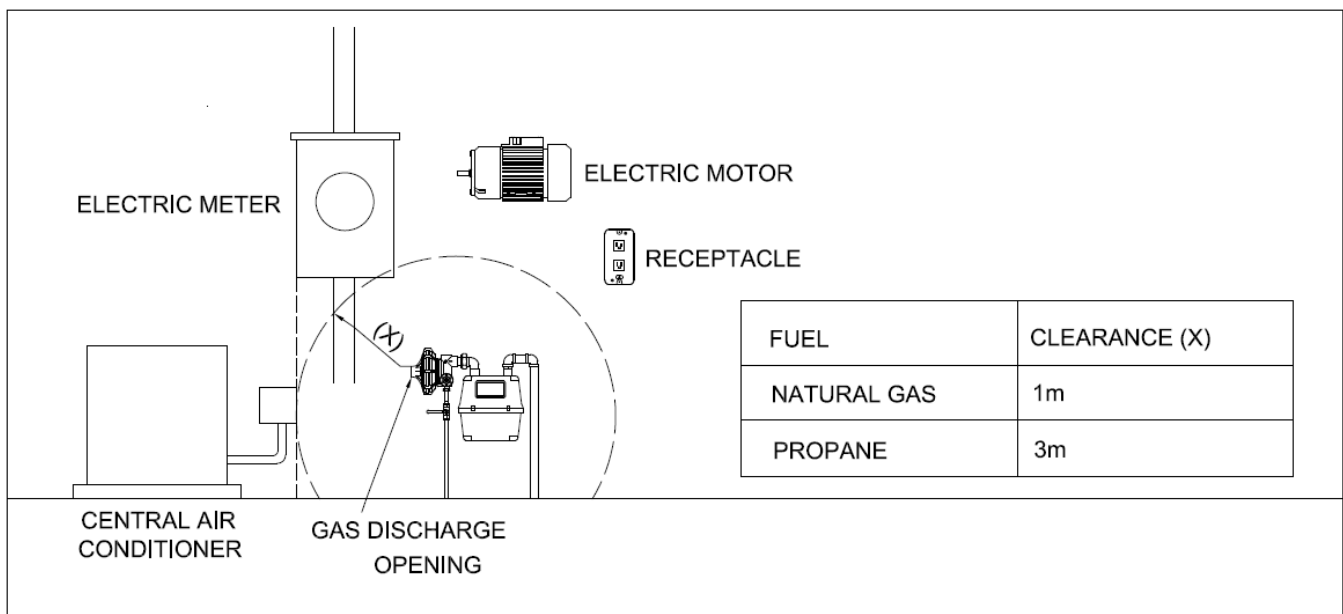
1. Be accessible to Hydro One 24/7.
2. Be installed in a clean, readily accessible location free from tripping or slipping hazards (e.g., snow, ice, or overgrown vegetation).
3. Not be installed in locations which may be hazardous to persons installing, testing, reading, or maintaining the equipment. This includes any area where moving machinery, dust, vibration, fumes, falling debris, corrosive vapours, water, and/or moisture will be present.
 - a. If installed indoors, installed in a dedicated electrical room.
 - b. If installed in a location with moving vehicles or machinery, mechanical protection is required, refer to [Protective Bollards for Metering Equipment](#).
4. Be easily and safely accessible (i.e., there shall be a safe entrance path).
5. Be free from obstructions or hinderance to maintain or service.
 - a. Meter-Mounting Device (MMD) shall be mounted on a wall free from any obstruction that may hinder the ability to replace or maintain the installation.
 - i. If MMD is recessed there shall be at least 100mm clearance on all sides and the meter-sealing ring shall at a minimum be flush with the mounting surface.
 - b. No obstructions that hinder the ability for the meter to communicate consistently over the AMI network.
 - i. Covers, cloaks, plates, or shields installed over meter or Meter-Mounting Device is not permitted.
 - c. Instrument Transformer Enclosure or Switchgear Enclosure doors shall not hinder the workers ability to perform maintenance on Metering equipment.
 - i. See 2.3.1.3 Working Space requirements.
6. If installed indoors:
 - a. Have adequate illumination and ventilation to carry out all work safely as per the OESC.
 - b. Be installed in a dedicated electrical room.
 - i. Continuous access, by key or other appropriate means, provided to Hydro One or its authorized agent.
 - c. For details on who may install a Meter Installations indoors, please refer to Hydro One Conditions of Service.
7. Have poles installed, owned, and maintained by the Customer when Meter Installations are located on poles on the Customer's property.

8. Have the centre of the meter display be at 1750mm ±100mm, above finished grade. The exceptions to this requirement are:
 - a. Meters mounted on a 6x6 post as per [DU11-201](#) (1500mm-1600mm above finished grade)
 - b. Meter Centres
9. Meter installation shall have a permanent label detailing the service disconnect (including disconnect nomenclature, location, and service voltage) on the front panel of the service main box.

2.3.1.3 Working Space

The Customer shall meet the latest amendments of OESC Rule 2-308 Working space around electrical equipment, 2-314 Accessibility for Maintenance and 2-328 Electrical Equipment near combustible gas equipment. All meters shall adhere to the working space requirement around electrical equipment demonstrated in Figure 1.

Figure 1. OESC Rule 2-308 Working Space Requirements



2.3.1.4 Entrance To, or Exit From, Working Space

The Customer shall meet the latest amendments of OESC Rule 2-310 Entrance to, and exit from, working space requirements around meters and metering equipment.

2.3.1.5 Illumination

When installed indoors (e.g., service room, power shed, service closet, etc.), the metering equipment shall be installed in a location with a minimum illumination of:

- 100 to 200 lux horizontal at 750 mm above grade; and
- 100 lux vertical at the front face of the meter.

Lighting in spaces containing metering equipment shall be controlled by a wall switch at the room entrance.

2.3.2 Mobile Homes, Trailer Parks & Campgrounds

Please see Mobile Homes, Trailer Park & Campgrounds in the [Hydro One Conditions of Service](#).

2.3.3 Un-Metered Service Connections

For more information please see Unmetered Connections in the [Hydro One Conditions of Service](#).

2.3.4 Metering Output for Load Management

Please see Metering Pulses in the [Hydro One Conditions of Service](#).

Metering interface for Customer monitoring equipment which uses pulse outputs shall meet the following additional requirements:

- Wetting voltage shall be a maximum of 120V DC or 120V RMS AC
- Current shall not exceed 100 mA DC.

2.3.5 Totalized Metering

Please see Totalized Metering in the [Hydro One Conditions of Service](#).

2.3.6 Protective Bollards for Metering Equipment

Where metering is installed in a location with moving vehicles or machinery the Customer shall supply, install, and maintain protective bollards around the metering equipment to act as mechanical protection for Hydro One personnel against passing vehicles or machinery.

Bollards shall be required if the Metering Installation:

1. Is in an area that can be accessed by motor vehicles easily achieving speeds more than 20km/hr, regardless of posted speed limits.
2. Is in an area that will be subject to grounds maintenance equipment operating within 1m of the metering equipment such as snow clearing equipment and riding lawn mowers.

Table 1 - Construction Drawings - Protective Bollards

Drawing	Description
<u>DU6-107-0500</u>	PROTECTIVE BOLLARDS INSTALLATION

2.3.7 Meter-Mounting Devices

Hydro One requires the use of Meter-Mounting Devices (MMD) that meet build and construction standards for use in Hydro One service territory. For general requirements and examples of

MMD that meet Hydro One requirements, please refer to [CSA-Approved Meter-Mounting Devices](#).

2.3.8 Transformer-Rated Meter-Mounting Enclosure

Hydro One supplies a NEMA Type 3R Transformer-Rated (T/R) Meter-Mounting Enclosure that houses a T/R Meter, fusing, test switches, a modem, and a receptacle. This meter enclosure is often referred to as a “P-Base” enclosure.

The T/R Meter-Mounting Enclosure shall be:

1. Supplied, owned, and maintained by Hydro One.
2. When used for Secondary Metering <750V:
 - Installed by the Customer as per [Metering Installation Accessibility](#).
 - All conduit connected to the T/R Meter-Mounting Enclosure shall be supplied, owned, and maintained by the Customer.
 - No elbows with covers or pull boxes for conduits between the IT Enclosure and the Meter-Mounting Enclosure.
 - No knockouts above the test switch.
 - Be installed to Hydro One standard, visible, and accessible from all sides along with all conduits.
 - Be installed in a location approved by Hydro One within 10m of the IT Enclosure or UMC.
3. When used for [Primary Metering](#) >750V:
 - Installed by Hydro One.

2.3.9 Suite Metering

In March 2006, the Ontario Government passed Bill 21, the Energy Conservation Responsibility Act, which enables implementation of the smart metering initiative in Ontario homes and small businesses. As part of the review of its energy policies, the government implemented additional measures to enable installation of AMI meters in condominiums. Thus, under the Distribution System Code 5.1.9, Hydro One shall install suite metering that meet the specifications stated by Ontario Regulation 389/10 to all multi-unit complexes when it is requested. This may include metering after second stage of transformation.

To allow Hydro One to meter individual units downstream of Customer owned transformation:

1. The installation shall use conventional ANSI style meters installed in Meter Centre's and which abide by Hydro One Distribution Standards and this Guide.
2. The existing rate structure shall be sufficient for this installation and a transformer loss adjustment factor will not be considered.

3. A CSA approved transformer that meets the efficiency standard of CSA C802.1 shall be installed by the Customer and approved by ESA. The Customer will not be entitled to a Customer supplied transformation allowance.
4. Hydro One does not provide unit sub-metering service for the Customer (i.e., metering devices in-line with a bulk meter and a breakdown of costs/metering for individual units). Customers have the option to hire a unit sub-metering contractor to provide this service
5. A review of a single line diagram by Hydro One may be required to ensure this option is the best solution for the Customer and Hydro One. A second supply of the desired voltage to the Customer may be appropriate.

2.3.10 Neutral Grounding Resistors

Customers wishing to install or remove Neutral Ground Resistors (NGR) on the secondary side of the Customer owned service transformer shall obtain Hydro One's permission before proceeding, including obtaining approval for the metering configuration. Customers will cover all costs associated with ensuring that metering complies with Hydro One Distribution Standards. For systems with an NGR installed at a voltage above 750V, Hydro One will review the request for connection and determine next steps.

2.3.10.1 Responsibilities

If an NGR is present on a system under 750V, 3 Element Metering is required. The Customer will be required to pull an insulated neutral into the Switchgear Utility Metering Compartment or into the Metering IT Enclosure Compartment.

The Customer shall:

1. Pull insulated neutral from X0 of interface transformer and terminate on an insulated neutral terminal block inside the Switchgear Utility Metering Compartment (UMC) or IT Enclosure
 - Neutral must be insulated the entire length.
 - Sized as required in the OESC.
 - Must be white or taped white.
2. Ensure the Switchgear UMC or IT Enclosure are specified to house 3 VT's and 3 CT's (3 Element Metering) along with a neutral terminal block.
 - If field modifications are required to accommodate 3 Element Metering, the Customer shall complete a CSA SPE-1000 inspection.
3. A permanent legible sign shall be posted on the IT Enclosure or UMC stating NGR is installed.
4. Meet requirements of the OESC for installing an NGR.

2.3.11 Arc-Flash Incident Energy Calculations

Customers may be required to provide Arc-Flash Incident energy calculations (CSA Z462 standard) at the IT Enclosure or Utility Metering Enclosure within Switchgear for services where Transformer-Rated metering is required.

3. Service Connection Types

This section is divided into two types of services – “Secondary Metered” below 750V and “Primary Metered” above 750V. Services metered below 750V with a service size less than 200A are described as “Self-Contained” (S/C) Metering Installations. A S/C meter is connected directly to the supply voltage and is in series with the Customer load. Services metered below 750V with load or generation above 200A are described as “Transformer-Rated” Metering Installations. A T/R Metering Installation unlike a S/C Metering Installation requires external instrument transformer(s) to isolate and step down the current and, if necessary, the voltage. If the secondary service size is larger than 4000A, the installation may be primary metered at a service voltage above 750V. The section requirements apply to both load and generation Customers eligible for Hydro One’s secondary metering for over-head & under-ground connections after a single stage of transformation, where the interface transformers shall be designed to meet the energy efficiency standards in CSA C802.1 Minimum Efficiency Values for Power Transformers. For additional requirements pertaining to generation connections, see section on [Embedded Generation](#).

Note: Hydro One may choose to install a T/R Metering Installation for services under 200A.

Hydro One supports a variety of metering configurations to meter Customer services. The configuration used to meter a Customer service will be determined by Hydro One. The metering configuration Hydro One chooses may depend on the following:

- Service Voltage (V)
- Service Size (A)
- Number of Metering points on a property
- Electrical Room Equipment:
 - a. Switchgear
 - b. Meter-Centres, Meter Stacks

3.1 Services Metered Under 750V – Secondary Metering

A service is “secondary metered” when the metering installation is located on the secondary side of a distribution transformer. Secondary metering is Hydro One’s preferred metering arrangement. Hydro One will supply a single stage of transformation to the Customer’s utilization voltage at standard voltages only. Hydro One will determine how the installation shall be metered.

Table 2 - Standard Secondary Voltages

Hydro One Standard Secondary Voltages	Service Configuration	Number of Phases and Wires
120/240V	-	1 Phase, 3W
120/208V(Network)	-	2 Phase, 3W
120/208V	Wye	3 Phase, 4W
*277/480V	Wye	3 Phase, 4W
347/600V	Wye	3 Phase, 4W
*600V (TR only)	Delta	3 Phase, 3W

*Although Hydro One can meter at these voltages, these are non-standard secondary voltages where the interface transformers are supplied by the Customer.

The Customer shall contact Hydro One prior to commencing work or buying equipment, to ensure the installation in its entirety shall be built in accordance with Hydro One Distribution Standards. In addition, the location of metering shall be such that it is safe and capable of being reached quickly for operation, maintenance, renewal, or inspection. For more details, refer to [Metering Installation Accessibility](#).

3.1.1 Services Metered Up To 200A – Self-Contained Metering

This section refers to S/C metering for all single and three-phase Customers where the metering point does not exceed 200A. Services exceeding these requirements shall require T/R metering. For typical S/C meter configurations, refer to [Self-Contained Metering Configurations](#).

3.1.1.1 Self-Contained Metering Configurations

This section outlines construction guidelines for different types of Hydro One approved single and three-phase S/C Metering configurations and outlines the responsibilities of the Customer as well as Hydro One. For Meter-Mounting Devices (MMD) requirements see [CSA Approved Meter-Mounting Device](#). For details on ownership and demarcation, please see the [Hydro One Conditions of Service](#).

S/C MMD's may be configured with single-position (individual) or multiple-positions that have a grouped supply. Generally, properties with a single tenant or dwelling, require one metering point whereas a property with multiple tenants requires multiple metering points. A single-position MMD may be used for services with one metering point and a multi-position MMD may be used for services with multiple metering points.

Elbows with covers, pull boxes or splitters for conduits between the Service Transformer and the MMD are not permitted.

Table 3 - Typical S/C Metering Installation Configurations

Service Configuration	Meter Jaws (ANSI Form Factor)	Single or Multiple Position MMD	Service Size (A)	MMD Install Location from Main Service Box	Metering Configuration	Figure
120/240V (1PH, 3W)	4-Jaw (2S)	Single	≤ 200	Line	<u>Single-Position MMD</u>	2.A
		Multiple	≤ 200	Line/ Load*	<u>Multiple-Position MMD</u>	2.B 2.C
		Multiple	> 200	Load		2.D
120/208V (3PH, 4W)	5-Jaw (12S Network)	Single	≤ 200	Load**	<u>Single-Position MMD</u>	3.A
		Multiple	> 200	Load**	<u>Multiple-Position MMD</u>	3.B 3.C
120/208V, 277/480V, 347/600V (3PH, 4W)	7-Jaw (16S)	Single	≤ 200	Load	<u>Single-Position MMD</u>	4.A
		Multiple	> 200		<u>Multiple-Position MMD</u>	4.B 4.C

*200A per position max rating and dependent on ESA approval of the MMD location with respect to the Main Service Box.

**Hydro One standard is for the neutral jaw to be at the 9 o'clock position

Three-phase S/C MMD shall be installed on load side of service box. Additionally, multiple-position MMD such as meter-centres, or meter stacks must have meters installed on load side of sub-service disconnecting device.

Figure 2A – Typical 120/240V Single-position Self-Contained Metering Installations

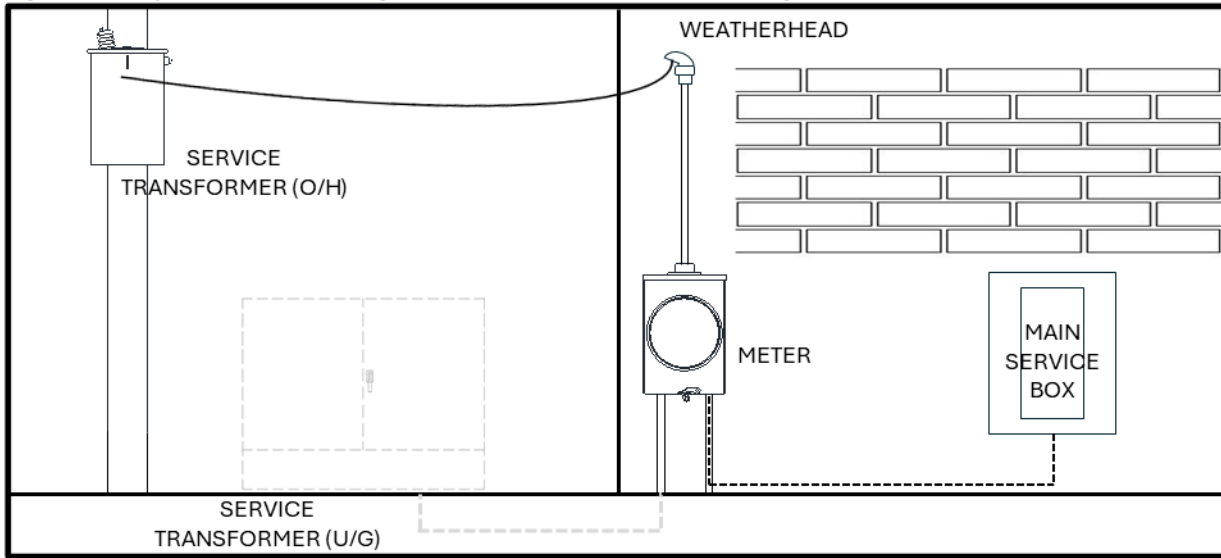


Figure 2B – Typical 120/240V Multiple-position, ≤ 200 MMD Self-Contained Metering Installations

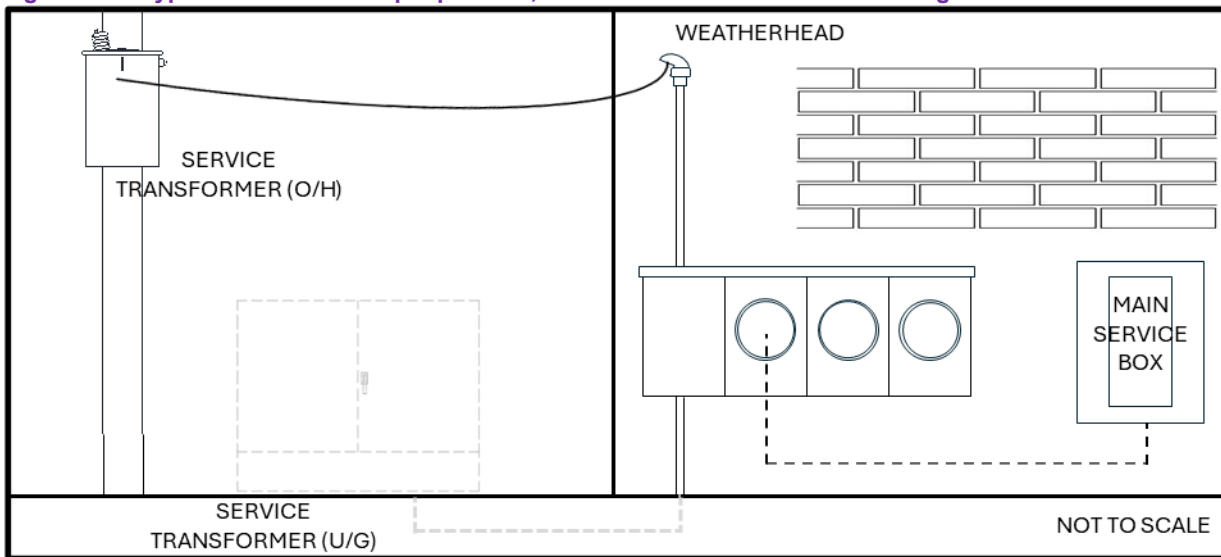


Figure 2C – Typical 120/240V, Multi-Position (>400A Main) MMD Self-Contained Metering Installations

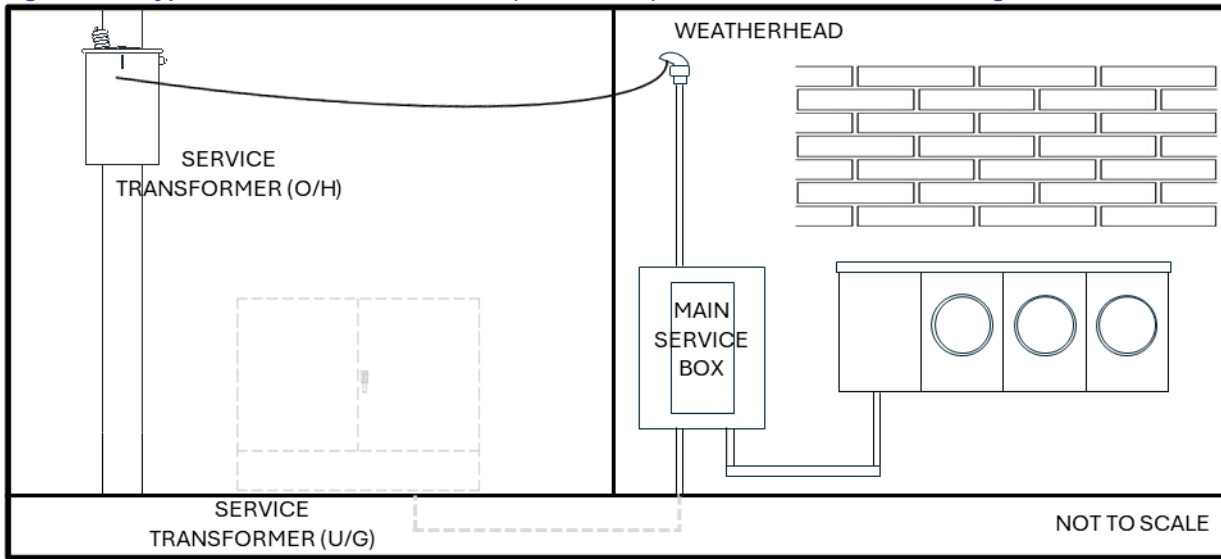


Figure 2D – Typical 120/240V Multi-Position MMD Self-Contained Metering Installations

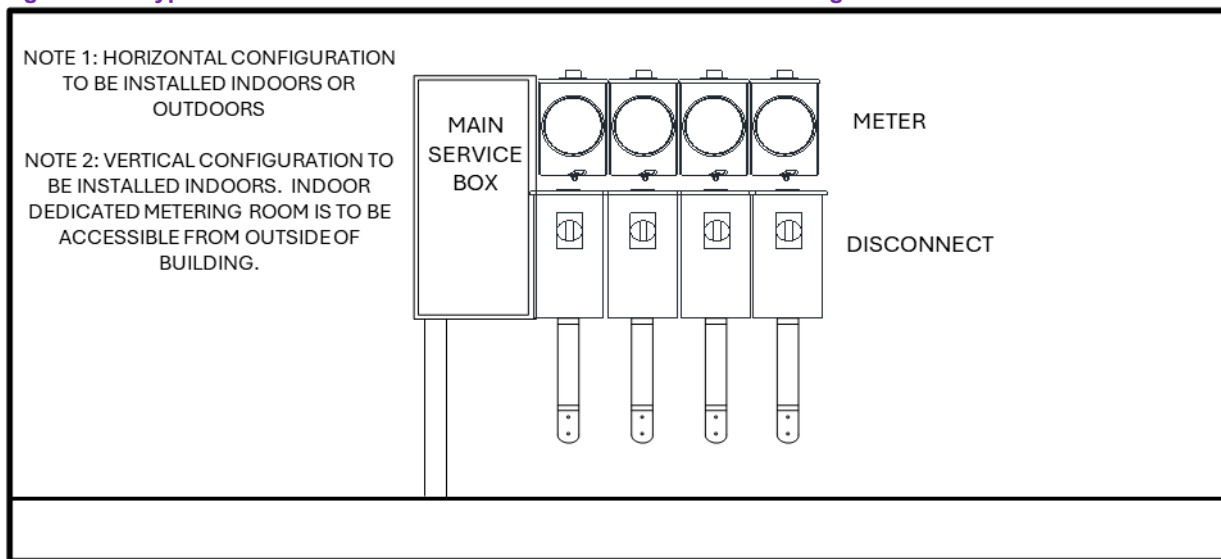


Figure 3A – Typical 120/208V Single-Position MMD Self-Contained Metering Installations

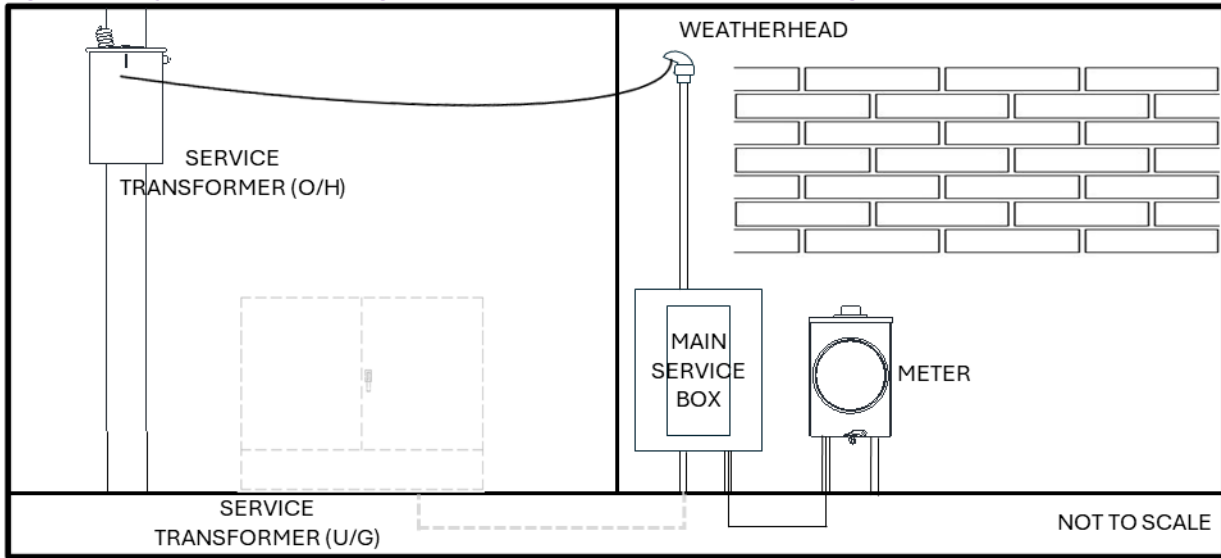


Figure 3B – Typical 120/208V Multi-Position, Grouped Supply MMD Self-Contained Metering Installations

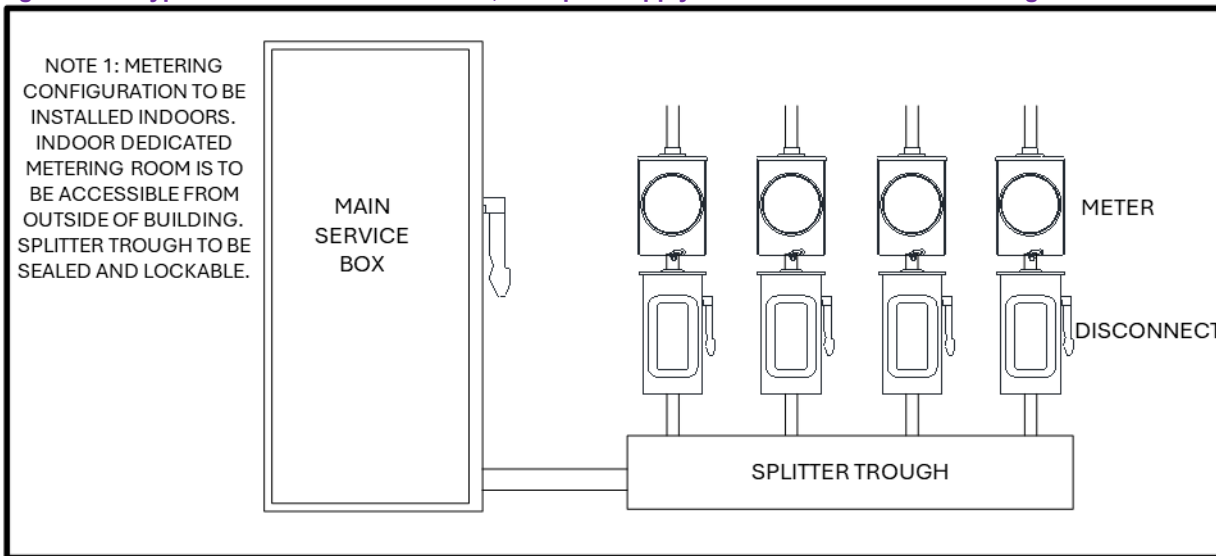


Figure 3C – Typical 120/208V Multi-Position MMD, Meter Centre, Self-Contained Metering Installations

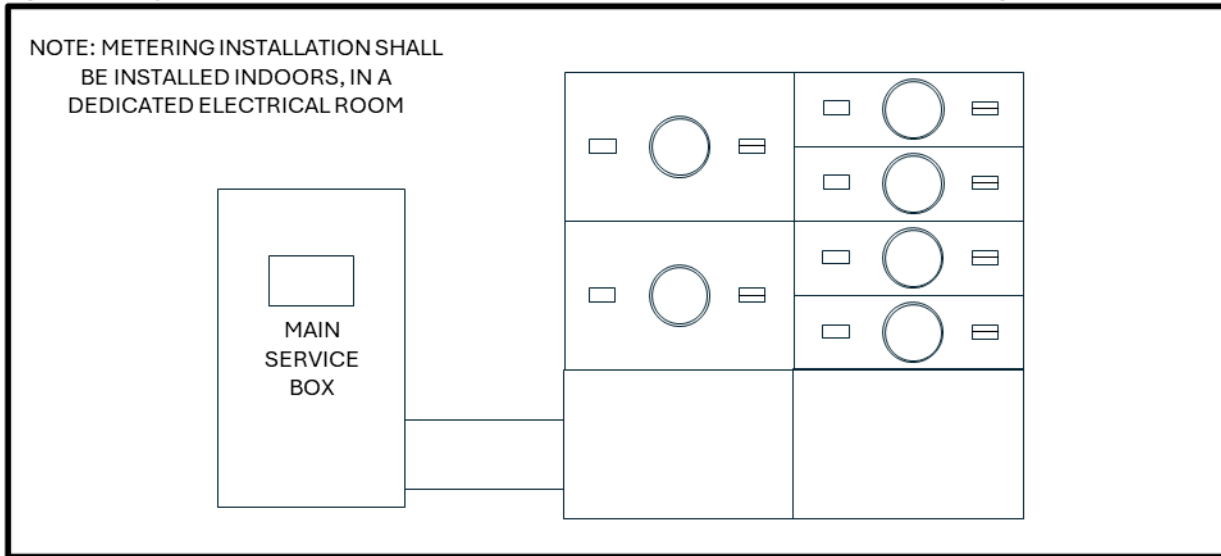


Figure 4A – Typical 120/208V, 277/480V, 347/600V Single-Position MMD, Self-Contained Metering Installations

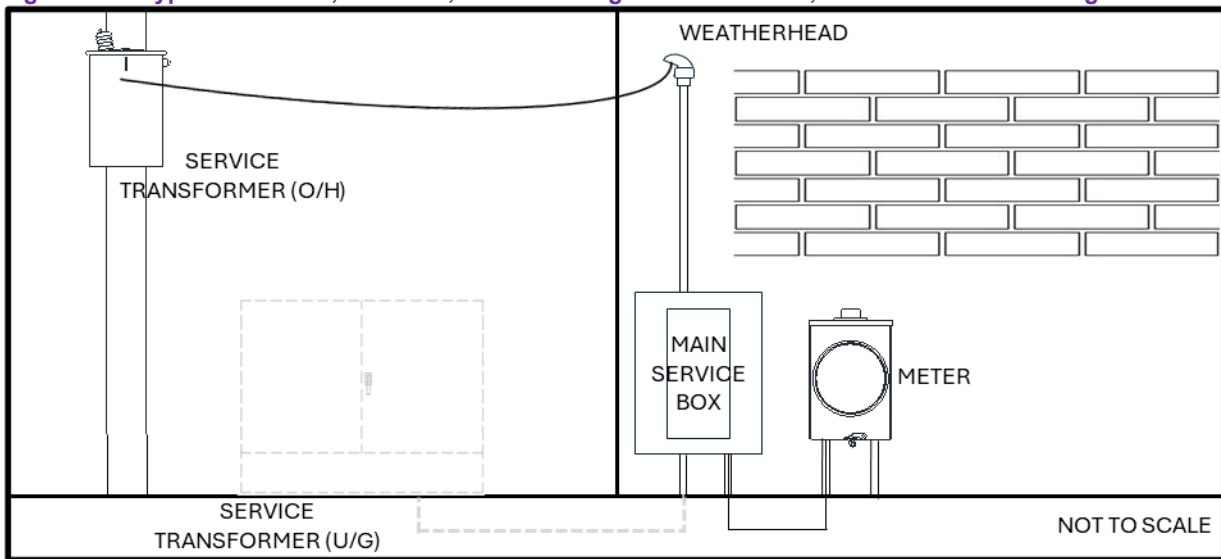


Figure 4B – Typical 120/208V, 277/480V, 347/600V Multiple-Position MMD, Self-Contained Metering Installations

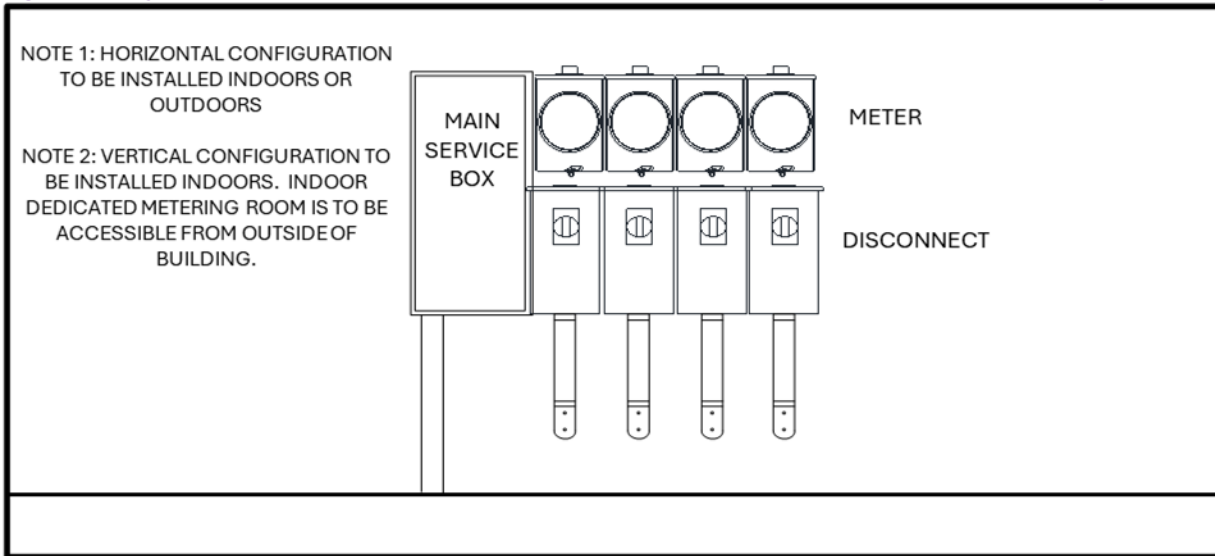
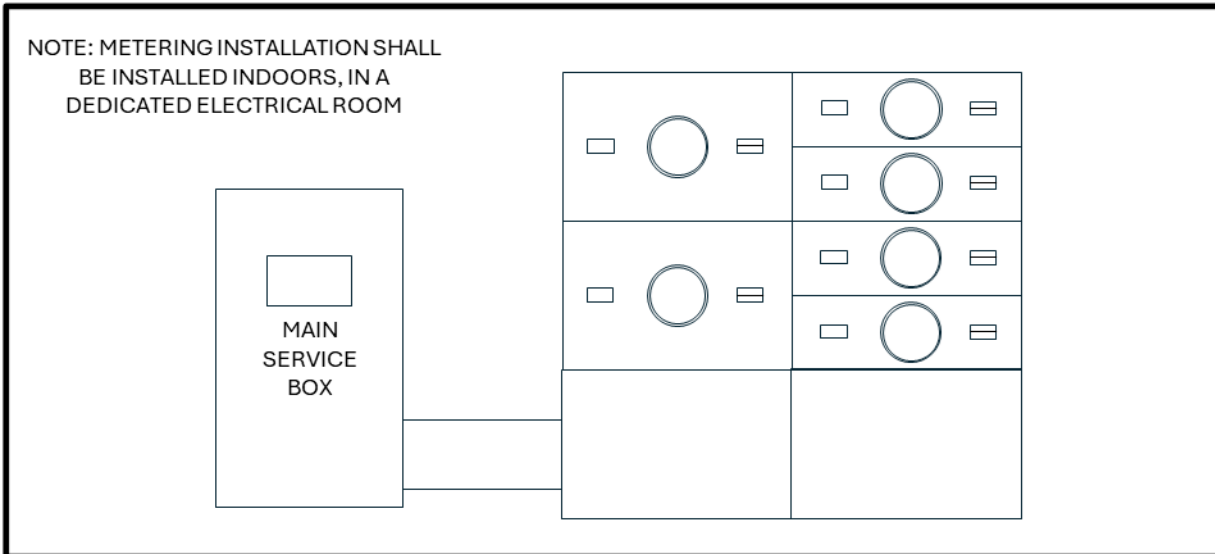


Figure 4C – Typical 120/208V, 277/480V, 347/600V Multi-Position MMD, Meter Centre Self-Contained Metering Installations



3.1.1.1.1 Single-Position Meter-Mounting Device (MMD)

Where the Customer service does not exceed 200A, a Single-Position MMD may be mounted on a building or a pole. Where a Customer has a combination MMD & circuit breaker unit, the Customer’s responsibility includes the breaker. In all cases, regardless of any labels, stickers, or nameplates identifying otherwise, the Customer owns and is responsible for repairs and maintenance of the MMD and circuit breaker.

For single and three-phase services metered with a single-position MMD (i.e., up to 200A main service), the Customer shall provide equipment to comply with the following arrangements, and in a location acceptable to Hydro One.

Table 4 - Construction Drawings - Single Position Meter-Mounting Device (MMD)

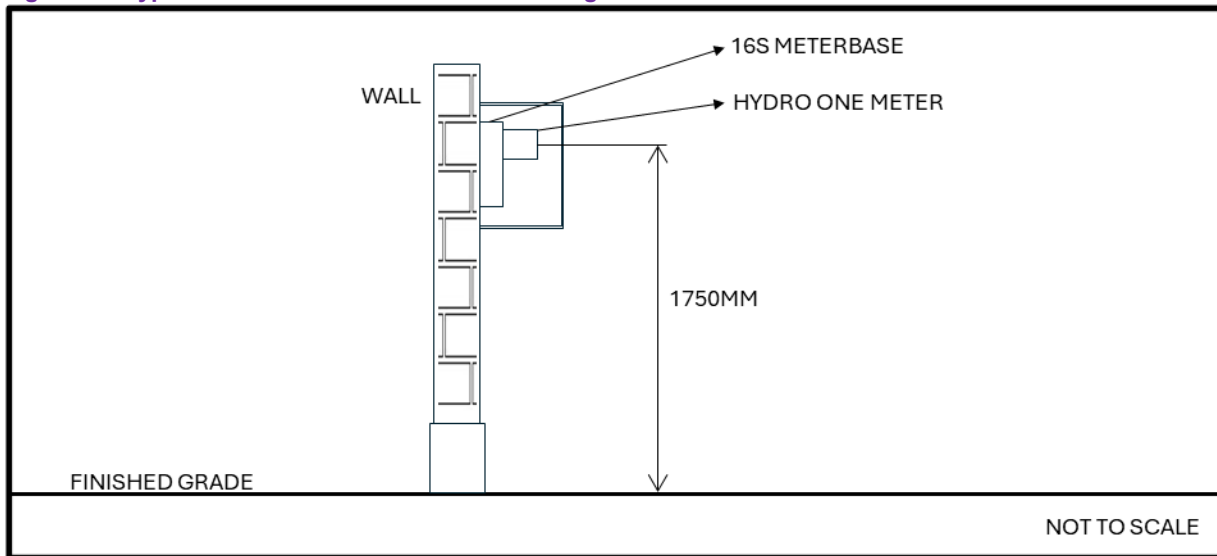
Drawing	Description
DU11-101	TRENCH DETAIL – SEC. SERVICE CABLE FROM U/G DUCTED TRENCH TO METERBASE (SHEETS 1 & 2)
DU11-102	TRENCH DETAIL – SECONDARY SERVICE CABLE FROM DIP POLE TO METERBASE (SHEETS 1, 2 & 3)
DU11-103	TRENCH DETAIL – SEC.SERVICE CABLE FROM U/G ALL-IN-DUCT TRENCH TO METERBASE (SHEETS 1 & 2)
DU11-104	TRENCH DETAIL – SECONDARY SERVICE CABLE FROM UNDER-GROUND TRENCH TO METERBASE UP TO 200A – ALTERNATE ARRANGEMENTS, 1-PH., 120/240v
DU11-111	TYPICAL UNDERGROUND SECONDARY SERVICE CABLE TERMINATIONS AT THE METER BASE UP TO 200A OR UP TO 400A, 1-PH, 120/240V, 3-WIRE
DU11-201	PEDESTAL MOUNTED SELF-CONTAINED METERING UP TO 200A FROM PAD-MOUNTED TRANSFORMER, 1-PH., 120/240V, 3-WIRE

The Single-Position MMD shall:

1. Meet the requirements of the [CSA-Approved Meter-Mounting Devices](#).
2. Have no alterations unless approved by Hydro One or the OEM:
 - Meter jaw arrangements factory installed or modified to meet service requirements using an OEM supplied conversion kit

Three-phase, 347/600V, S/C metering installations, up to 200A are to be located indoors in a dedicated electrical room. Customers that do not have a building facility available, such as electrical charging stations, shall be required to install the MMD within an Enclosure as shown in Figure 5- Typical 347/600V Self-Contained Metering Installation - MMD Inside Enclosure, or in a permanent barriered area, such as with a chain-link fence, or install a [T/R Metering Installation](#).

Figure 5 – Typical 347/600V Self-Contained Metering Installation - MMD Inside Enclosure



A 16S Meter Socket shall be installed within a permanent enclosure outdoors provided:

1. The permanent enclosure shall be outdoor rated and tested to meet the following standard:
 - Minimum NEMA Type 3R
 - If at any time the enclosure does not meet its original rating, the Customer is required to replace the enclosure.
2. The enclosure shall be mounted on a wall, pole, or post.
 - If installed on a wooden post, please refer to [Metering Installation on a Wooden Post](#)
3. There exists a viewing window that permits easy and obvious viewing into the permanent enclosure.
4. There exists a provision for a padlock.
5. When the MMD and meter are installed inside the enclosure:
 - The enclosure and door shall not interfere with the installation or removal of the meter.
 - Meter depth of HONI 3-PH S/C meter
 - 15.24mm (6") from meter ring to optical port
 - The serviceability of the MMD, including, but not limited to installation, reading or removal of the meter, shall not be hindered by any part of the larger enclosure it resides within.
 - 100mm of clearance shall be provided between each side of the Meter and the enclosure walls.

3.1.1.1.1 Responsibilities

The Customer shall:

1. Install the MMD such that it meets the requirements indicated in [Metering Installation Accessibility](#).
2. Install, own, and maintain:
 - MMD, breaker (if installed) and conduits.
 - The pole, if applicable.
3. Install the metering's grounding system.
 - Ownership shall be transferred to Hydro One prior to energization.
4. For pad-mount facilities, install, own, and maintain the vault and the grounding to ESA requirements.
5. For over-head connections, install, own, and maintain up to the top of the service entrance stack.
6. For under-ground connections, install, own, and maintain the load side of the MMD.
7. For installations requiring a MMD installed inside a meter enclosure:
 - Install, own, and maintain the meter enclosure.

Hydro One shall:

1. Terminate the conductors to the MMD on the line side if conductors are owned by Hydro One.
2. Maintain equipment of the secondary service that it owns (e.g., repair and like-for-like replacement of wire or cable that has failed irreparably).
3. Install, own, and maintain the meter.

3.1.1.1.2 Self-Contained Metering Installation Installed on a Wooden Post

For single-phase and three-phase main services up to 200A, it may be preferable to install the metering equipment on a wooden post due to the nature of the service (e.g., parks, temporary installation, utilities, sports facilities, etc.), or due to the location not being suitable to install the metering equipment in a permanent building. After obtaining Hydro One consent, the Customer may choose to install the meter and MMD on a wooden post, ahead of the main service box.

Table 5 - Construction Drawings - Metering on a Wooden Post

Drawing	Description
DU11-201	PEDESTAL MOUNTED SELF-CONTAINED METERING UP TO 200A FROM PAD-MOUNTED TRANSFORMER, 1-PH., 120/240V, 3-WIRE

When metering on a wooden post:

3.1.1.1.2.1 Responsibilities

The Customer shall:

1. Install, own, and maintain the wooden post.
2. Install, own, and maintain the conduits to the MMD on both the line and load side, as well as any other construction materials (e.g., clamps, etc.) to CSA standard in accordance with the OESC.
3. Install, own, and maintain all wiring on the load side of the meter.
4. Install, own, and maintain grounding to OESC.
5. Install, own, and maintain the MMD on the post as defined under [MMD Customer Responsibilities](#).

Hydro One shall:

1. Terminate the conductors to the MMD on the line side if conductors are owned by Hydro One.
2. Maintain equipment of the secondary service that it owns (e.g., repair and like-for-like replacement of wire or cable that has failed irreparably).
3. Install, own, and maintain the meter.

3.1.1.1.3 Multiple-Occupancy Metering

Please see the section on Multi-Occupancy Metering in the [Hydro One Conditions of Service](#).

3.1.1.1.3.1 Multi-Position Meter-Mounting Device – 2 to 6 Position, ≤ 400A Main Service

When metering is required for building structures, where there is a common supply point, such as a condominium or townhouse, a horizontal or vertical trough style Multi-Position MMD shall be permitted. The building structure shall have no more than six units. For services exceeding six units or 400A, a Meter Centre can be used. Refer to [Meter-Centre](#) for more information.

Table 6 - Construction Drawings - Multi-Occupancy Metering

Drawing	Description
DU11-101	TRENCH DETAIL – SEC. SERVICE CABLE FROM U/G DUCTED TRENCH TO METERBASE (SHEETS 1 & 2)
DU11-102	TRENCH DETAIL – SECONDARY SERVICE CABLE FROM DIP POLE TO METERBASE (SHEETS 1, 2 & 3)
DU11-103	TRENCH DETAIL – SEC.SERVICE CABLE FROM U/G ALL-IN-DUCT TRENCH TO METERBASE (SHEETS 1 & 2)
DU11-104	TRENCH DETAIL – SECONDARY SERVICE CABLE FROM UNDER-GROUND TRENCH TO METERBASE UP TO 200A – ALTERNATE ARRANGEMENTS, 1-PH., 120/240V

The Multiple-Position MMD shall:

1. Meet the requirements of [CSA-Approved Meter-Mounting Devices](#).
2. Have no alterations unless approved by Hydro One or the OEM:
 - Meter jaw arrangements factory installed or modified to meet service requirements using an OEM supplied conversion kit
3. Have a separate main service supply compartment, that is pad-lockable.

3.1.1.1.3.1.1 Responsibilities

The Customer shall:

1. Install the MMD such that it meets the requirements indicated in [Metering Installation Accessibility](#).
2. Install, own, and maintain the MMD and ancillary equipment other than the meter.
3. Provide clear, permanent, and unambiguous nomenclature.
 - Refer to Multi-Occupancy Metering in the [Hydro One Conditions of Service](#).
4. Have unused positions covered with a Customer supplied UV rated cover of Lexan or strong plastic and a stainless-steel sealing ring. Each unused metering position shall not have load side conductors installed.

Hydro One shall:

1. Terminate the conductors to the MMD on the line side if conductors are owned by Hydro One.
2. Maintain equipment of the secondary service that it owns (e.g., repair and like-for-like replacement of wire or cable that has failed irreparably); and
3. Install, own, and maintain the meter.

3.1.1.1.3.2 Multiple-Position Meter-Mounting Devices – More than 6 Position or > 400A Main Service

When metering is required for Multiple-Occupancy services consisting of more than six units or greater than 400A service, the Customer shall supply a Meter Centre installed load side of the main service box for the building. Each meter position shall be installed on the load side of the sub-service disconnect device. These Meter Centres shall be applicable for up to 200A per position, 120/240V, 120/208V and 347/600V services.

The Meter Centre shall:

1. Be certified to CSA C22.2 No. 229 Switching and Metering Centres.

2. Meet the requirements of the [CSA-Approved Meter-Mounting Devices](#)
3. Have no alterations unless approved by Hydro One or the OEM:
 - Meter jaw arrangements factory installed or modified to meet service requirements using an OEM supplied conversion kit

3.1.1.1.3.2.1 Responsibilities

The Customer shall:

1. Install the Meter Centre such that it meets the requirements indicated in [Metering Installation Accessibility](#).
2. Install, own, and maintain the Meter Centre and all ancillary equipment other than the meter.
3. Ensure the Meter Centre is installed on the load side of the main service box.
4. Each Meter within the Meter Centre shall:
 - Be located on the load side of the sub-service disconnecting device.
 - Be protected by a sub-service disconnecting device having an adequate rating to handle the short circuit interruption capacity for the service.
 - Have a provision for locking the sub-service disconnecting device in an open position.
5. Provide clear, permanent, and unambiguous nomenclature.
 - Refer to Multi-Occupancy Metering in the [Hydro One Conditions of Service](#).
6. Have any surplus meter positions that may be used for future additional loads removed/disabled by the contractor with a manufacturer supplied blanking plate to cover the MMD opening and breaker section, and meter positions shall have a blank plastic Meter-Mount Cover and a meter sealing ring installed.
7. Install the Meter Centre in a central service room where it shall be separated from the rest of the building by an approved fire separation.

If the Meter Centre is to be installed outside of the building, **the Customer shall:**

1. Ensure the Meter Centre is installed inside a permanent NEMA Type 3R enclosure of the Customers construction. It shall consist of a permanent roof and walls that meets the requirements of the Ontario Building Code, and shall be covered with brick, siding, or stucco. It shall provide secure access to the metering equipment contained inside and shall be subject to acceptance of Hydro One.
2. When the meters are located inside the enclosure, it must be secure from the public and accessible to Hydro One's employees, agents, and contractors at all hours, to permit meter readings, the changing of meters, and access to metering equipment, and must be locked. The access doors must be able to accommodate a standard Hydro One padlock.

3. Ensure that the enclosure provides adequate mechanical protection for the equipment inside against damage not caused by ordinary wear and tear or acts of god (not including any of insect infestation, animals, or plant/tree growth).

Hydro One shall:

1. Install, own, and maintain the meter.

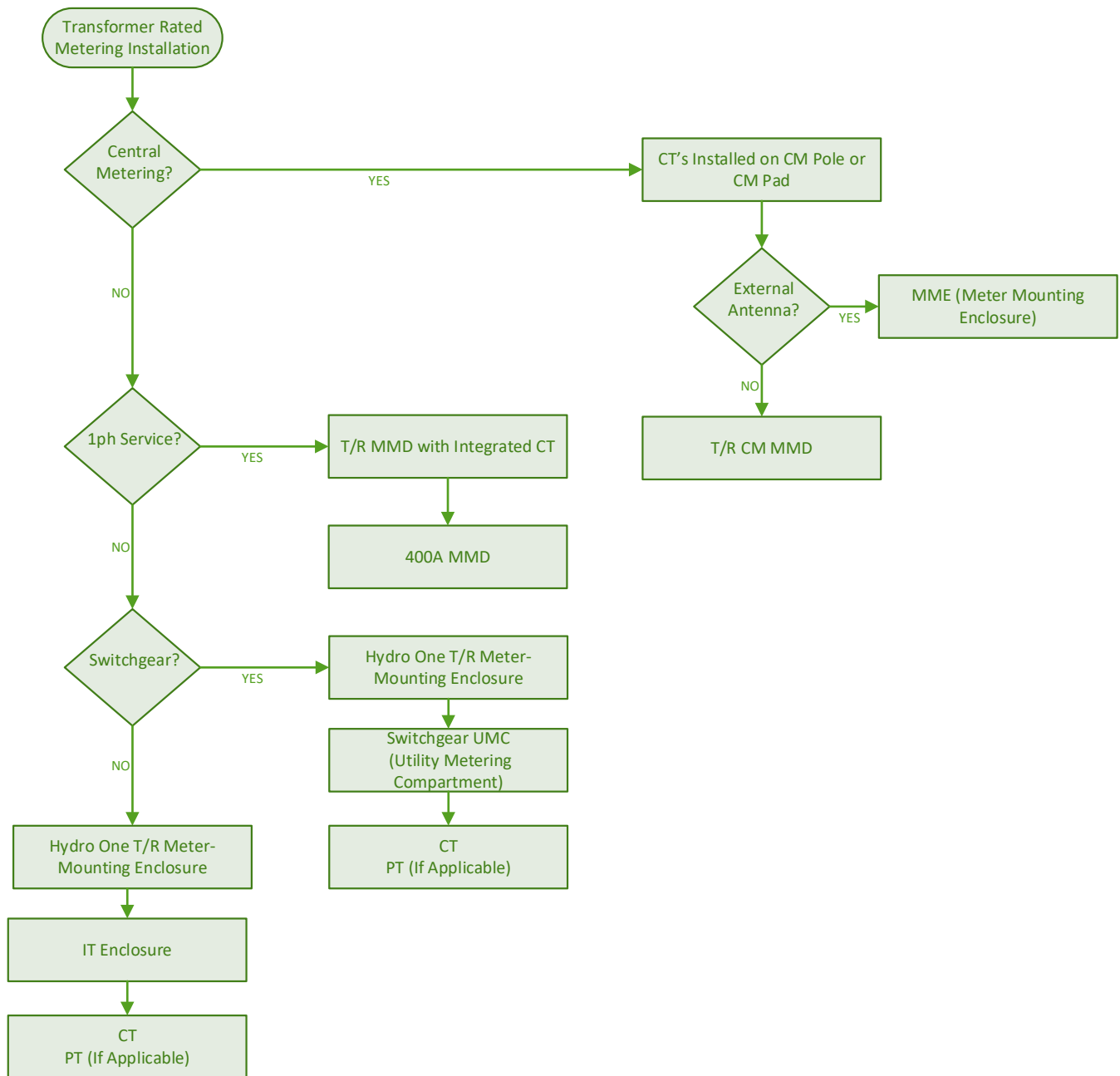
3.1.2 Services Metered Over 200A & Up To 4000A – Transformer-Rated Metering

Single or three-phase services where the metering point is, or is anticipated to be, more than 200A shall use Transformer-Rated (T/R) metering. T/R metering installations unlike S/C, require instrument transformers to step down the current and if necessary, the voltage, to levels that are safe for workers and the equipment that interacts with them. In a T/R installation, current transformers are always required, and they are normally housed in an enclosure. Customers requesting a secondary service shall contact Hydro One prior to commencing work or buying equipment. All secondary installations shall be reviewed and pre-approved by Hydro One prior to construction.

Typically, a T/R metering installation is constructed using the following:

1. T/R Meter & MMD or
2. T/R Meter, Meter-Mounting Enclosure & Instrument Transformer Enclosure
 - a. CM service, CTs mounted on pole or inside pad-mount transformer.

Figure 2 - Typical Transformer Rated Metering Installation Components



For typical installation arrangements, refer to division of Sub-Sections below based on type of service.

Table 7 - Typical T/R Meter Installation Configuration

Service Configuration	Meter Jaws (ANSI Form Factor)	Service Size (A)	T/R Metering Installation Location from Service Box(s)	Metering Configuration	Figures
120/240V (1PH, 3W)	5-Jaw (3S)	>200 - ≤400	Line	T/R MMD with Integrated CT	Figure 7
		>200 - ≤600		Central Metering – CM MMD	Figure 8
		>200 - ≤800	Load	T/R Meter-Mounting Enclosure & IT Enclosure	Figure 9
				T/R Meter-Mounting Enclosure & Switchgear (UMC)	Figure 10
120/208V 277/480V 347/600V (3PH, 4W)	13-Jaw (9S)	>200 - ≤1000	Load	T/R Meter-Mounting Enclosure & IT Enclosure	Figure 9
		>200 – ≤4000		T/R Meter-Mounting Enclosure & Switchgear – UMC	Figure 10
600V (3PH, 3W)	8-Jaw (45S)	>200 – ≤1000	Load	T/R Meter-Mounting Enclosure & IT Enclosure	Figure 9
		>200 – ≤4000		T/R Meter-Mounting Enclosure & Switchgear (UMC)	Figure 10

Figure 7 - T/R MMD with Integrated CT (O/H or U/G)

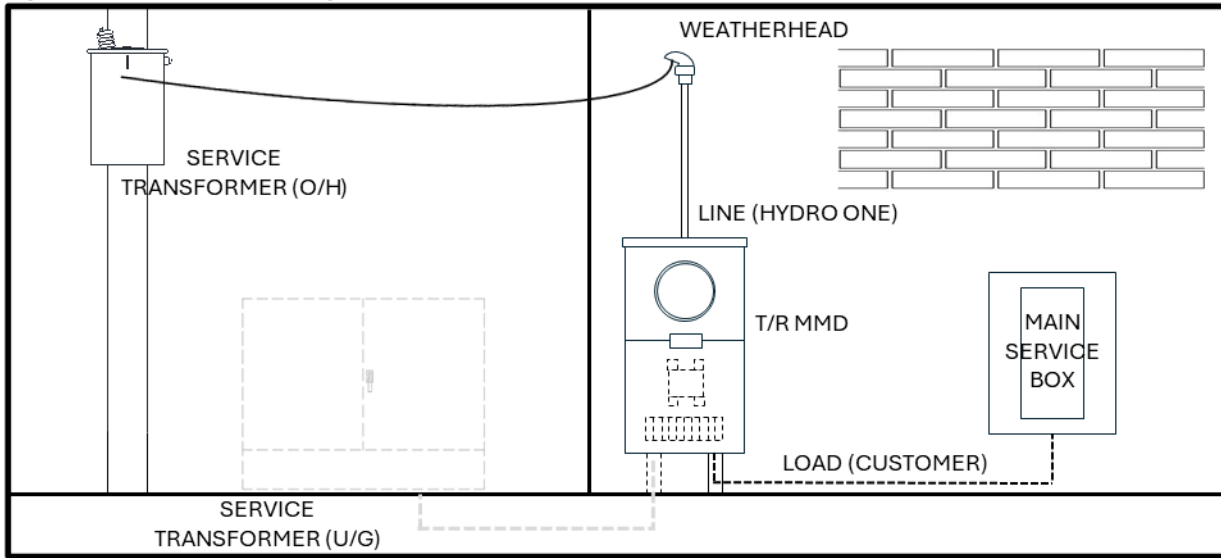


Figure 8 - Central Metering – CM MMD (O/H or U/G)

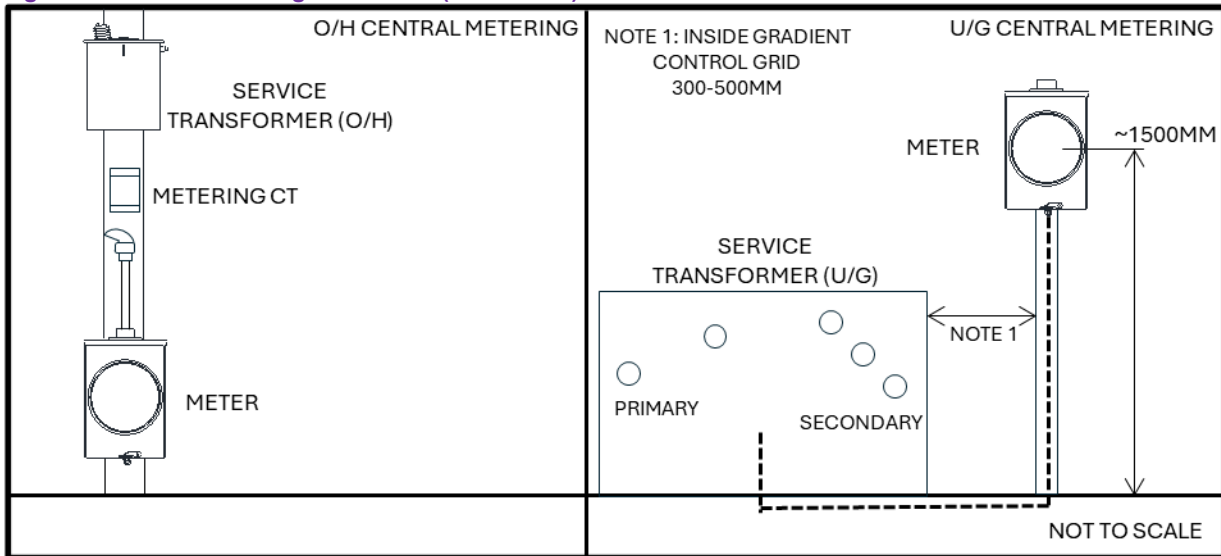


Figure 9 - T/R Meter-Mounting Enclosure & IT Enclosure

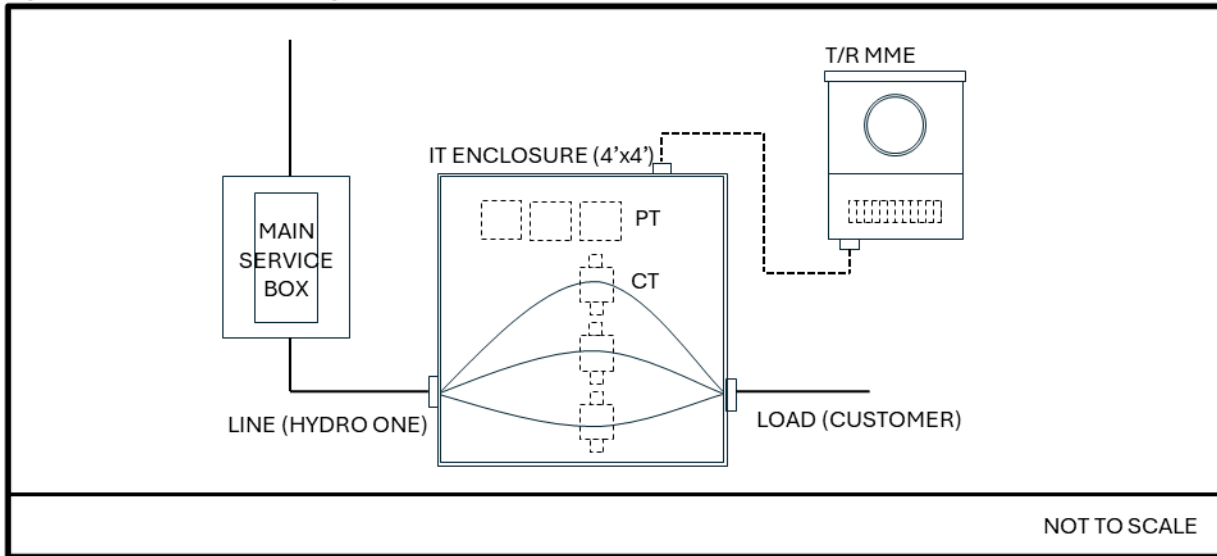
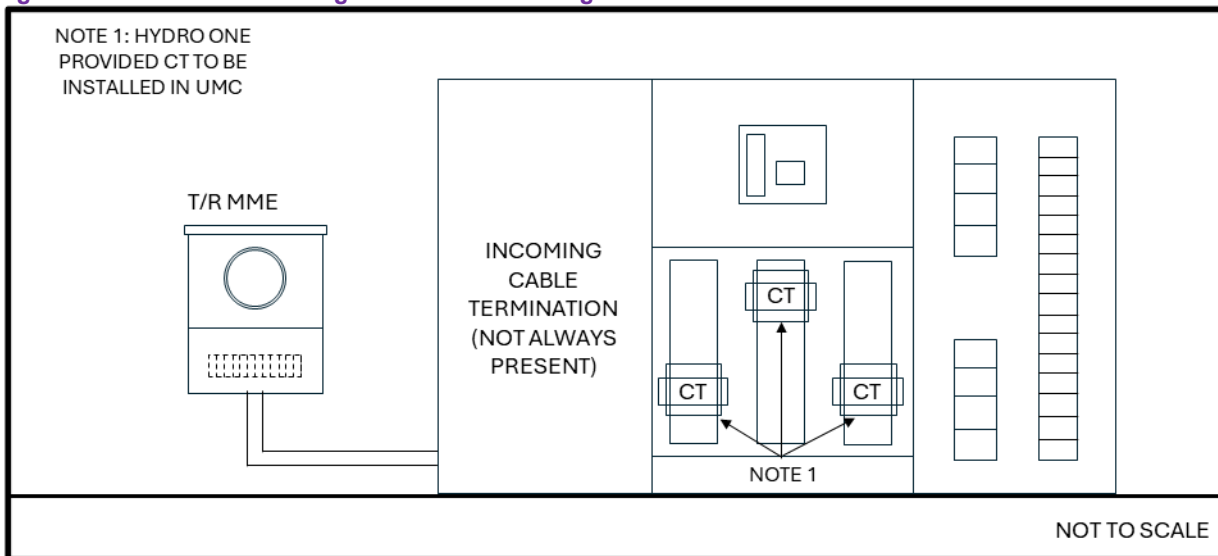


Figure 10 - T/R Meter-Mounting Enclosure & Switchgear – UMC



3.1.2.1 T/R MMD with Integrated CT's

3.1.2.1.1 Construction Guidelines

Single-phase, 120/240V services where the total service box size is between 200A and 400A, a T/R MMD with integrated CT's may be used. The T/R MMD with integrated CT's consists of a 5-Jaw meter mounting device, 4-position test switch and is to be installed on the line-side of the Customer service box.

Table 8 - Construction Drawings - T/R MMD with Integrated CT's

Drawing	Description
DU11-101	TRENCH DETAIL – SEC. SERVICE CABLE FROM U/G DUCTED TRENCH TO METERBASE (SHEETS 1 & 2)
DU11-102	TRENCH DETAIL – SECONDARY SERVICE CABLE FROM DIP POLE TO METERBASE (SHEETS 1, 2 & 3)
DU11-103	TRENCH DETAIL – SEC.SERVICE CABLE FROM U/G ALL-IN-DUCT TRENCH TO METERBASE (SHEETS 1 & 2)
DU11-113/ RM7-303-0500	TYPICAL UNDERGROUND SECONDARY SERVICE CABLE TERMINATIONS AT THE TRANSFORMER RATED METER BASE, 400A, 1-PH, 120/240V, 3-WIRE
RM7-304-0500	O/H INTEGRATED METERBASE, 1 x 3W BAR CT, 1-PH, 3W, 120/240V, CONSTRUCTION CWD UP TO 400A, FULL MULTIPLIER

The T/R MMD with Integrated CT shall:

1. Meet the requirements of the [CSA-Approved Meter-Mounting Devices](#).
2. Have no alterations unless approved by Hydro One or the OEM:
 - o Meter jaw arrangements factory installed or modified to meet service requirements using an OEM supplied conversion kit

3.1.2.1.2 Responsibilities

The Customer shall:

1. Install the T/R MMD such that it meets the requirements indicated in [Metering Installation Accessibility](#).
2. Install, own, and maintain T/R MMD, breaker (if installed) and conduits.

Hydro One shall:

1. Terminate the conductors to the T/R MMD on the line side if conductors are owned by Hydro One.
2. Supply, install, and connect the CT required for the T/R MMD. The CT installation will be completed by Hydro One on or before the date of connection.
3. Install, own, and maintain the meter, CT, and all secondary wiring within the T/R MMD.

3.1.2.2 Central Metering

Hydro One, at its discretion, will consider requests from Customers to provide Central Metering (CM) for single-phase, 120/240V or three-phase 120/208V, over-head and underground service. CM may be used to meter two or more buildings, up to a maximum of four, belonging to one Customer. Customers requiring Central Metering are limited to 600A of total calculated or anticipated load current. Any additional services shall be connected downstream of the CM point at a remote location or pony pole. All Customer work and equipment must be certified by

ESA. For more details on CM services, please refer to Central Metering in the [Hydro One Conditions of Service](#). Typically, CM services will require the installation of a T/R CM MMD.

3.1.2.2.1 Construction Guidelines - Central Metering – Pole-Mounted

Pole-mounted CM will be permitted for single-phase 120/240V or three-phase 120/208V services up to 600 amperes of anticipated or calculated load, where all CM equipment will typically be located on a Customer owned pole ahead of the Customer services box(s). Three-phase services will require a T/R Meter-Mounting Enclosure. See section on [T/R Meter-Mounting Enclosure](#).

Note: Hydro One shall install a #10AWG green conductor, bonded to the down ground at the stack near the CT at the time of connection. Electrical Contractors shall not use copper ground wire to bond the Meter-Mounting Device on a pole.

Table 9 - Construction Drawings - CM Pole-Mounted

Drawing	Description
DL11-305-0500/0501	CENTRAL METERING FOR SECONDARY DROP LEADS (1-CT ARRANGEMENT) 1-PH., 3-WIRE, 120/240V (SHEETS 1 & 2)
RM7-309-0500	SOCKET METER-BASE ENCLOSURE, 1PH, 3W, 120/240V, CONSTRUCTION CWD (for CM System)

The T/R CM MMD shall:

1. Meet the requirements of the [CSA-Approved Meter-Mounting Devices](#).
2. Have no alterations unless approved by Hydro One or the OEM:
 - o Meter jaw arrangements factory installed or modified to meet service requirements using an OEM supplied conversion kit

3.1.2.2.2 Construction Guidelines - Central Metering – Pad-Mounted

At Hydro One’s discretion, a Customer may be metered using a pad-mounted CM service as an alternative to pole-mounted CM. Please note that the preferred CM option is pole-mounted metering and Customers may be required to pay for additional labour and material costs of a pad-mounted CM service.

Note: A commercial Meter Pedestal may be allowed upon Hydro One’s discretion. It is the Customer’s responsibility to obtain Hydro One’s approval prior to procurement and installation.

Table 10 - Construction Drawings - CM Pad-Mounted

Drawing	Description
DU11-202-0500	CENTRAL METERING NEAR PAD-MOUNTED TRANSFORMER, 1-PH. 120/240V, 3-WIRE
RM7-309-0500	SOCKET METER-BASE ENCLOSURE, 1PH, 3W, 120/240V, CONSTRUCTION CWD (for CM System)

3.1.2.2.3 Responsibilities

The Customer shall:

1. Install, own, and maintain:
 - T/R CM MMD with 4 or 10 position test switch.
 - All service conductors, equipment, and facilities on the load side of the meter.
2. For pole-mounted CM, supply, install, own, and maintain:
 - Masts, entrance conduits and CM pole
3. For pad-mounted CM, supply, install, own, and maintain:
 - Wooden post
 - Install wooden post connection to the ground gradient control grid.
Refer to [DU11-202-0500](#)
 - Conduits to the T/R CM MMD

Hydro One shall:

1. For pad-mounted CM:
 - Supply and install the pad-mount transformer including terminations on primary and secondary connections.
2. Supply secondary wire harness and CTs and install CM as per Hydro One Distribution Standards, including #10AWG green conductor to ground the T/R CM MMD.
3. Install, own, and maintain the meter.

3.1.2.3 T/R Meter-Mounting Enclosure & Instrument Transformer Enclosure

This section shall focus on metering requirements when the instrument transformers (IT) are housed in a NEMA-rated IT Enclosure in conjunction with a separate, [T/R Meter-Mounting Enclosure](#).

3.1.2.3.1 Construction Guidelines

Table 11 - Construction Drawings - T/R Meter-Mounting Enclosure & Instrument Transformer Enclosure

Drawing	Description
RM8-300-0500	T/R METER ENCLOSURE LAYOUT 3PH, 3W OR 4W, UP TO 600V, CONSTRUCTION DWG
RM8-301-0500	IT ENCLOSURE - 3 X 2W BAR CT, 3PH, 4W, 120/208V, CONSTRUCTION CWD
RM8-302-0500	IT ENCLOSURE - 3 X 2W DONUT CT, 3PH, 4W, 120/208V, CONSTRUCTION CWD
RM8-303-0500	IT ENCLOSURE - 2 X 2W BAR CT, 3PH, 3W, 600V, CONSTRUCTION CWD
RM8-304-0500	IT ENCLOSURE - 2 X 2W DONUT CT, 3PH, 3W, 600V, CONSTRUCTION CWD
RM8-305-0500	IT ENCLOSURE - 3X 2W BAR CT, 3PH, 4W, VOLTAGES OTHER THAN 120/208V, CONSTRUCTION CWD
RM8-306-0500	IT ENCLOSURE -3X 2W DONUT CT, 3PH, 4W, VOLTAGES OTHER THAN 120/208V, CONSTRUCTION CWD
RM7-308-0500	IT ENCLOSURE, 2 X 2W DONUT or BAR CT 1PH,3W, 120/240V, CONSTRUCTION CWD, ½ mult

The IT Enclosure shall:

1. Be applicable for the following service configurations with over 200A service size and one metering point per service entrance:
 - 1-PH, 3W 120/240V
 - 3-PH, 4W 120/208V, 277/480V, 347/600V
 - 3-PH, 3W 600V
 - Refer to metering requirements for **Neutral Grounding Resistor (NGR)** if NGR is installed.
2. Be minimum NEMA type 3R
3. Be secured with a padlock, and have a backplate to mount IT's, fuses, and bonding equipment to Hydro One specifications. Have a maximum of 3 runs of 500MCM or 2 runs of 750MCM cables per phase
 - **Metering inside Switchgear** is required for anything beyond this threshold.
4. Be a minimum of 48" x 48" x 12" for all 3-PH services.
5. Be a minimum of 36" x 36" x12" for 1-PH service up to 400A
6. Have the neutral enter the IT Enclosure. If the neutral is to be terminated in the IT Enclosure, an insulated neutral block in the IT Enclosure is required. Connection to the neutral with an Insulation Piercing Connector (IPC) shall be supplied and installed by Hydro One .
7. Connectors which pass through the side panel of the IT enclosure shall be self-sealing or must be sealed to prevent water ingress.
8. Only Hydro One approved material is to be housed within the IT enclosure.

3.1.2.3.2 Responsibilities

The Customer shall:

1. Install and maintain an IT Enclosure:
 - That meets the requirements in the [Construction Guidelines](#) mentioned above.
 - Where located indoors, shall be in the same room as the main service box.
 - Located on the load side of the main service box of the Customer facility.
 - Customer loads shall be connected on the load side of the instrument transformers
 - Surface mounted, visible, and accessible from all sides along with conduits.
 - Elbows with covers or pull boxes for conduits between the IT Enclosure and the Meter Enclosure are not permitted.
 - If using multiple conductors per phase through donut CTs, all conductors require phase tape to clearly mark them for traceability.
 - That does not house any Customer owned equipment and power factor correction monitoring equipment.
 - IT enclosure shall not be used as a pull-box
 - Conductors must maintain minimum bending radius at all times
 - If NGR is installed, ensure the installation meets the requirements for services with NGR.
 - For more details refer to section on [NGR](#)
2. Install the supplied T/R Meter-Mounting Enclosure:
 - Refer to [T/R Meter-Mounting Enclosure](#) for installation requirements.
3. Supply and install conduit between the IT Enclosure and the Meter Enclosure.
4. Install the IT Enclosure and Metering Enclosure such that it meets the requirements indicated in [Metering Installation Accessibility](#).
5. If there is generation connected after the Service Box, refer to section on [Distributed Generation](#) for additional requirements.

Hydro One shall:

1. Supply Measurement Canada approved IT's for revenue metering.
2. Supply, own and maintain the T/R Meter-Mounting Enclosure.
3. Make all connections to the VT including primary connections.
4. Install VT secondary fusing in IT Enclosure.
5. Install, own, and maintain the test switch, meter, and all meter wiring and terminations.

3.1.2.4 T/R Meter-Mounting Enclosure & Low-Voltage Switchgear with Utility Metering Compartment (UMC)

This section includes construction guidelines and responsibilities for metering using Switchgear assemblies. Switchgear assemblies shall be manufactured with a Utility Metering Compartment (UMC) that houses the Hydro One IT.

Manufactured enclosed switchgear assemblies under 750V shall be certified to CSA 22.2 No. 31 Switchgear Assemblies or C22.2 No. 244 for Switchboards. Certification shall be completed by a recognized certification body and shall be indicated on the drawings and the equipment nameplates. The switchgear shall be installed as per the Original Equipment Manufacturer (OEM). Customers metered within Switchgear require a Utility Metering Compartment (UMC) embedded within the Switchgear to house metering IT's and shall meet the construction guidelines defined in this guide. The UMC shall be used exclusively by Hydro One and shall not house any Customer owned equipment. Hydro One can support metering three-phase loads within the UMC up to 4000A. Loads above 4000A may require [Primary Metering](#).

3.1.2.4.1 Construction Guidelines

Table 12 - Construction Drawings - T/R Meter-Mounting Enclosure & Utility Metering Compartment (UMC)

Drawing	Description
RM8-300-0500	T/R METER ENCLOSURE LAYOUT 3PH, 3W OR 4W, UP TO 600V, CONSTRUCTION DWG
RM8-307-0500	TYPICAL LV SWITCHGEAR ARRANGEMENT UTILITY METERING COMPARTMENT 3 PHASE UNDER 750V (NEW)

Switchgear UMC shall:

1. Meet the requirements specified in Drawing RM8-307-0500.

3.1.2.4.2 Responsibilities

The Customer shall:

1. Supply and install a Switchgear with a UMC:
 - That meets the requirements in the [Construction Guidelines](#) mentioned above.
 - Where located indoors, shall be in the same room as the main service box
 - Located on the load side of the main service box.
 - Where conduit between UMC and T/R Meter-Mounting Enclosure shall be 1-1/4" and have no elbows with covers or pull boxes
 - If metering wire must go through another section of the SG, it must be in conduit.
 - If an NGR is installed, ensure the installation meets the requirements for services with an NGR
2. Securely mount ITs in the UMC

3. Install the supplied T/R Meter-Mounting Enclosure:
 - Refer to [T/R Meter-Mounting Enclosure](#) for installation requirements.
4. Supply and install conduit between the LV Switchgear UMC and the Meter Enclosure.
5. Install the LV Switchgear with UMC and Metering Enclosure such that it meets the requirements indicated in [Metering Installation Accessibility](#).
6. If there is generation connected after the Service Box, refer to section on [Distributed Generation](#) for additional requirements.

Hydro One shall:

1. Supply Measurement Canada approved IT's for revenue metering.
2. Supply, own and maintain the T/R Meter-Mounting Enclosure.
3. Make the IT connections within the UMC.
4. Install VT secondary fusing within the UMC.
5. Install, own, and maintain the test switch, meter, and all meter wiring and terminations.

3.2 Services Metered Over 750V – Primary Metering

3.2.1 General Requirements

Services exceeding 750V or 4000A may require the service to be metered by a Hydro One supplied and installed Primary Metering Unit (PMU). A primary metered Customer is eligible to be metered at the Hydro One supplied primary voltage present in the vicinity of the connection. Customers requesting primary metering shall contact Hydro One prior to commencing work for site eligibility confirmation and review.

PMU installations are subject to Hydro One approval and include the following considerations:

- The PMU is installed on the Customer property in a location approved by Hydro One.
- Hydro One has a line side disconnecting device at or near the Customer property line (demarcation point).
 - Ensure a minimum of 30m is maintained between the line side service disconnecting device and the PMU.
- Customer owned disconnecting device load side of PMU.
- For Large Distribution Accounts (equal to or greater than 2MVA of transformation capacity), with the exception of Wholesale Market Participants, Hydro One will supply and install a power quality meter (e.g. ION meter).
- The Customer should co-ordinate in-service dates with Hydro One well in advance to ensure long lead-time equipment can be delivered on time.
- Where minimal Customer loading makes Primary Metering impractical, Hydro One will only meter at a standard Secondary voltage. See [Services Metered Under 750V – Secondary Metering](#).

3.2.1.1 Primary Metering Requirements

A typical primary metering service will be required in the following situations:

1. The Customer's main service box exceeds 4000A.
2. Secondary metering is considered impractical due to:
 - Economic evaluation
 - Site conditions that prohibit a secondary metering installation
 - Site location that poses safety hazards, environmental concerns, or lack of ease of access
 - Other factors and considerations requiring further assessment such as presence of neutral ground resistors, two or more stages of transformation and/or others
3. The Customer requests a primary metering service:
 - A Customer will be invoiced for the incremental cost of a PMU over secondary metering.
 - A Customer will be invoiced for the incremental cost of a pad-mount PMU over a pole-mount PMU if the Customer has requested the upgrade.

3.2.2 Primary Metering – Pole-Mounted

3.2.2.1 Construction Guidelines

The location of the PMU and its ancillary equipment shall be determined in consultation with, and subject to approval by, Hydro One. Typically, the PMU is to be located on the first pole on the Customer property. The location shall be accessible by Hydro One to install and maintain this PMU.

Table 13 – Construction Drawings – Typical Primary Metering Pole-Mounted

Drawing	Description
<u>DL-11-301-0500/0501</u>	RETAIL METERING, O/H PRIMARY 1-PH., GROUNDED PRIMARY, (1-EL.) 2.4 kV - 16kV (SHEETS 1 & 2)
<u>DL-11-302-0500/0501</u>	RETAIL METERING, O/H PRIMARY 3-PH., 4W, GROUNDED WYE (3-EL.) 2.4/4.16kV-16/27.6kV (SHEETS 1 & 2)
<u>DL-11-302.1-0500/0501</u>	RETAIL METERING, SUBTRANSMISSION, 3PH, 3W, (2-EL.), 27.6kV & 44kV (SHEETS 1 & 2)
DL-12-301-0500	GROUNDING FOR OVER-HEAD INSTALLATIONS ON WOOD POLES, GROUND PLATE OR ROD UNDER-GROUND

3.2.2.2 Responsibilities

The Customer shall:

1. Be responsible for the purchase and installation of any poles, platforms, or other supporting structures required for Hydro One equipment.

2. Ensure that the distance between the PMU pole and any adjacent poles on the line/load side are at least 7m in order to allow direct vehicle access to the overhead metering point and the Customer's load break disconnect switch.
3. Install the PMU in a location that is 30m from the HONI disconnect switch.
4. Ensure the metering installation meets the requirements indicated in [Metering Installation Accessibility](#).

Hydro One shall:

1. Supply and install an approved pole-mount PMU.
2. Be responsible for making the connection from the supply
3. Install the service line disconnect and line and load side arresters.
4. Supply and install the [T/R Meter-Mounting Enclosure](#) on the PMU pole.

3.2.3 Primary Metering – Pad-Mounted

3.2.3.1 Construction Guidelines

A pad-mount PMU is intended for use where the service is fed from underground, and the metering is measured at the primary voltage supplied by Hydro One. The pad-mount PMU shall be installed as per Hydro One Distribution Standards on Customer owned property.

Table 14 – Construction Drawings – Typical Primary Metering Pad-Mounted

Drawing	Description
DU-12-101-0500	GROUNDING FOR PAD-MOUNTED EQUIPMENT – TYPICAL CONCRETE FOUNDATION INSTALLATIONS WITH GROUND ROD OR GROUND PLATE
DU-12-102-0500	GROUNDING FOR PAD-MOUNTED EQUIPMENT – TYPICAL ALUMINUM BASE INSTALLATION WITH GROUND ROD OR GROUND PLATE
DU15-121-0500	EQUIPMENT FOUNDATION INSTALLATION CONCRETE FOUNDATION FOR DIRECT BURIED INSTALLATIONS

3.2.3.2 Responsibilities

The Customer shall:

1. Be responsible for the purchase and installation of any poles, foundations, platforms, or other supporting structures required for Hydro One equipment.
2. Supply primary cables with concentric neutral subject [to Hydro One approval](#).
Note: The Customer to ensure primary cables are of sufficient length to allow operation of the elbows with live line tools. Primary cables are to be coiled at the bottom of the Pad-mount vault as per Hydro One standard.
3. Supply and install the load break switch on the load side of the pad-mount PMU.

4. Supply and install a concrete foundation (vault) for the metering pad-mount in a location that is minimum 30m from the HONI disconnect switch and subject to Hydro One standards.
5. Ensure the metering installation meets the requirements indicated in [Metering Installation Accessibility](#).
6. Customer to ensure that the metering pad-mount shall meet the following minimum clearances:
 - 3m for the operating side
 - 3m for the live front
 - 1m for all other sides
7. If installed in a location with moving vehicles or machinery, mechanical protection is required. Refer to [Protective Bollards for Metering Equipment](#) for additional information.

Hydro One shall:

1. Supply an approved pad-mount metering unit designed for medium voltage with a dead front design, outdoor rated and tamper proof, for above grade installation on a concrete vault.
2. Supply and terminate the elbow connections on the primary cables.
3. Supply and install bushing inserts, and caps to match the system voltage, cable size and load.
4. Supply a [T/R Meter-Mounting Enclosure](#) installed on the side of the pad-mounted metering unit.

4. Embedded Generation

Embedded Generators are solely responsible for all commercial arrangements entered into with the IESO concerning their Embedded Generation Facility. This includes the IESO contract application process and contract administration.

Embedded Generators shall ensure that their Embedded Generation Facility meets the technical requirements specified in Appendix F.2 of the Distribution System Code, the Ontario Electrical Safety Code, and the Technical Interconnection Requirements (TIR) (including any Hydro One (TIR) update in the form of bulletins and/or amendments).

If there is a conflict between the Technical Interconnection Requirements and the technical requirements in Appendix F.2 of the Distribution Code, Appendix F.2 will take precedence.

Embedded Generation Facilities also include Net Metered Generation Facilities.

The net metering arrangement option (see Ontario Regulation 541/05 for additional details) is available to Customers wanting to install Embedded Generation provided that the Hydro One Distribution System can support the maximum cumulative output capacity of the Embedded Generation Facility equipment to be connected.

The location of revenue meters and the location of Instrument Transformer(s), if applicable, are subject to Hydro One's discretion and approval.

Please refer to Embedded Generation in the [Hydro One Conditions of Service](#).

4.1 Governing Principles

Hydro One Networks Inc. shall comply with the conditions outlined in its Ontario Energy Board (OEB) Distribution License, and all regulatory and legal obligations.

The following are Governing Principles for Hydro One:

- Minimize the risk of injury to the public and Hydro One employees.
- Conform to applicable Market Rules and Distribution System Code requirements.
- Comply with Measurement Canada, Hydro One's Technical Interconnection Requirements and Electrical Safety Authority requirements.

4.2 General Requirements

In addition to the metering requirements listed in [Service Connection Types](#), the following applies to Distributed Generation:

1. Generators shall provide Hydro One with a copy of the “as built” Single Line Diagram (SLD) showing revenue metering connection in the format specified by Hydro One.
 - The final “as built” Single Line Diagram shall be signed and stamped by a Professional Engineer registered in the Province of Ontario.
 - Main service box shall have a permanent, legible sticker/sign/label displaying the “as built” SLD on the front panel of the service main box.
 - Distribution/Interface Transformer Size, ownership and configuration
 - Type of DG contract (Net, Storage or Load Displacement)
 - Type and Size of Generator
 - Include size of each generating unit or inverter
 - Switchgear (if applicable)
 - Capacity Rating (A)
 - Main Service Box
 - Size (A)
 - Meter & IT Information
 - Illustration of UMC & T/R Meter-Mounting Enclosure
 - Back-Feed Disconnect for Metering Work Protection
 - Location (Indoor/Outdoor)
 - Isolation point
 - Label/Name
 - Back-Feed Disconnect for Lines (HONI Owned Service TX)
 - Location (Outdoor) accessible, visible isolating point
 - Label/Name
 - Any other relevant information such as presence of existing stand-by generator and Automatic Transfer Switch
2. Hydro One requires:
 - A means of disconnection and proof of isolation for metering work. If multiple generators are connected at the generator facility, one disconnect switch shall be capable of isolating all the generators simultaneously.
 - A lockable disconnect shall be provided on the load side of the Instrument Transformer compartment.
 - The disconnect shall have a permanent, legible sticker/ sign/ label displaying its nomenclature on the front panel
3. Customers with a Generation Facility that sells energy and settles through Hydro One’s retail settlement system will be responsible for all costs for Hydro One to enable the generation. This included the costs to enable communication with the Head End billing system.

4.3 Embedded Generation Classes

Below, are the different classes of Distributed Generation:

1. Net Metering
2. Load Displacement Generators
3. Energy Storage Facilities
4. Emergency Back-Up Generation

4.3.1 Net Metering

Subject to the requirements outlined in the latest revision of the Distribution System Code, Ontario Regulation 541/05, and the latest revision of Hydro One's Conditions of Service, Hydro One offers Net Metering to eligible Customers on a first come, first served basis.

Hydro One shall apply the [General Requirements](#) in conjunction with one of the following types of metering installations for Net Metering eligible load Customers installing Embedded Generation stand alone or in parallel with MicroFIT:

1. [Services Metered Over 750V - Primary Metering](#)
2. [Services Metered Under 200A - Self-Contained Metering \(Generation Up to 50kW\)](#)
3. [Services Metered Over 200A & Up to 4000A \(Generation Above 50kW up to 500kW\)](#)

Hydro One will determine what type of meter to install based on the size of the generation.

The generation facility shall follow the applicable technical requirements document "Technical Interconnection Requirements for Distributed Generation, Micro Generation & Small Generation, 3-phase, less than 30 kW DT-10-20" or "the Distributed Generation Technical Interconnection Requirements, Interconnection at Voltages 50 kV and Below DT-10-015".

4.3.2 Load Displacement Generators

Please refer to Load Displacement DER Facilities in the [Hydro One Conditions of Service](#).

A meter replacement shall not be required for any existing load meter for all Load Displacement less than 500kW. However, all Load Displacement Embedded Generators, greater than 500kW, shall require a bi-directional 4-Quad PQ meter at PCC.

4.3.3 Energy Storage Facilities

Customers with an Energy Storage Facility, whether it is portable or permanently affixed, shall comply with the requirements of the Technical Interconnection Requirements and all the applicable criteria of the Ontario Electrical Safety Code. Furthermore, the Customer is responsible for complying with all applicable laws in respect of the Energy Storage Facility, including, all applicable environmental requirements. Customers with permanently affixed

Energy Storage Facilities shall notify Hydro One regarding the presence of such equipment and shall enter a DCA with Hydro One.

4.3.4 Emergency Back-Up Generation

Please refer to Emergency Back-Up Generation in the [Hydro One Conditions of Service](#).

CSA approved Meter-Mounting Device models with manual or Automatic Transfer Switches can be found in [CSA Approved Meter-Mounting Devices](#).

Customers intending to use a back-up generator and Transfer Switch attached to a MMD shall contact Hydro One for more information.

Hydro One is not responsible for any damage to such equipment during the installation, inspection, reading, maintenance, repair, alteration, removal, or replacement of all or any part of a Meter Installation. If the Transfer Switch is obstructing the metering installation during servicing, Hydro One will not be able to service the equipment.

5. Appendix

5.1 Units of Measurements

Recognized symbols for SI units have been used in the Canadian Electrical Code, Part I. For the convenience of the user, these symbols, and the units they represent have been listed below:

Unit Abbreviation	Unit Detail
A	ampere(s)
dBm	decibel
Hz	hertz
kcmil	1000 of Circular Mils
kW	kilowatt
kWh	kilowatt-hour
m	metre
mm	millimetre
V	Volt

5.2 Definitions & Abbreviations

Capitalized terms used in this Guide that are not defined below will have the meanings set out in Section 2 of the Ontario Electrical Safety Code or the Conditions of Service. Otherwise, capitalized terms used in this Guide will have the corresponding meanings as defined below in this Section 3.

400A T/R Meter-Mounting Device

A 400A rated, single-phase, transformer type, 5-Jaw Meter Mounting Device assembly with integrated CTs and 4 pole test-switch.

Acceptable

A product or service that meets Hydro One requirements.

AMI

Advanced Metering Infrastructure.

American National Standards Institute or ANSI

Is the primary organization for fostering the development of technology standards in the United States.

American Wire Gauge or AWG

The American (or Brown and Sharpe) Wire Gauge as applied to non-ferrous conductors and non-ferrous sheet metal.

Bonding Point

A junction point in a Meter Socket, which connects the non-current-carrying metal parts of electrical equipment.

Burden

A load, usually expressed in volt-amperes, which is placed on instrument transformer secondary terminals by the associated meter coils, leads and other connected devices.

Typical burdens for current transformers (CT): BO.1 (2.5 VA), BO.2 (5 VA), BO.5 (12.5 VA), BO.9 (22.5 VA), B1.8 (45 VA).

Typical burdens for potential transformers (VT): W (12.5 VA), X (25 VA), Y (75 VA), Z (200 VA) and ZZ (400 VA).

Central Metering

Two or more services, up to a maximum of four, belonging to one Customer with one transformer-type Meter Installation. Additional services shall be connected downstream of the Central Metering point on a Pony Pole.

Conditions of Service or COS

Describes Hydro One's operating practices and connection policies and sets out the terms and conditions upon which Hydro One offers, and the Customer accepts Distribution Services.

Connection Wiring Diagram or CWD

An electrical diagram, which shows the terminal-to-terminal physical wiring connections from one device to another.

Current Transformer or CT

An instrument transformer designed for the measurement of current. The CT primary terminals are connected in series with the conductor carrying the current to be measured. There are three different types of Current Transformers – Bar Type, Donut Type and Window Type.

Current Transformer – Bar Type

An instrument current transformer that has a fixed, insulated straight conductor in the form of a bar, rod or tube connected in series with the load.

Current Transformer – Donut Type

A specific type of instrument current transformer, which has an opening in the centre, which is normally circular in shape, through which the primary conductor passes.

Current Transformer – Window Type

A specific type of instrument current transformer that has an opening in the centre, which is rectangular or circular in shape, through which the primary (bus bar) conductor passes.

Canadian Standards Association or CSA

Canadian Standards Association is a provider of product testing and certification services for electrical, mechanical, plumbing, gas, and a variety of other products. It is recognized in the U.S. and Canada. A product with a CSA registered mark shows that it has been independently tested and certified to meet recognized standards for safety and performance. In addition, it authors the Electrical Safety Code.

T/R Central Metering (CM) Meter-Mounting Device (MMD)

20A rated, single-phase, transformer type, 5-Jaw Meter Mounting Device assembly with 4 or 10 pole test-switch. Normally used for Central Metering.

CT Ratio

A number that is derived by dividing the primary rating of the CT by the secondary current of the CT (e.g. for a CT rated 400:5 A, the ratio would be 80).

Customer

A person that has contracted for or intends to contract for connection of a building or an embedded generation facility. This includes developers of residential or commercial subdivisions.

Demand Meter

A metering device, which indicates or records the peak value of power consumed over specified time duration as approved by Measurement Canada, usually expressed in kW, kVA, or kVAR.

Disconnect switch (Isolation Device)

An isolating device that conforms to OESC Section 84 and additional Hydro One requirements to ensure a safe and reliable means of electrically isolating the generation or load facility from Hydro One's Distribution System.

Distribution Generator Interface Transformer or DGIT

Interconnection of Distribution Generators with the utility distribution feeders

Distribution Standards

Hydro One standards for design and construction of Retail Revenue Metering, Over-head and Under-ground installations for all Hydro One-owned Distribution System assets less than 44kV.

Distribution System Code or DSC

Distribution System Code sets the minimum conditions that a distributor shall meet in carrying out its obligations to distribute electricity under its license and the Energy Competition Act, 1998. It applies to all retailers, generators, distributors, transmitters, and Customers of electricity who use the distributor's distribution system.

Embedded Generator or Embedded Generation Facility

A generator whose generation facility is not directly connected to the IESO-controlled grid but instead is connected to a distribution system.

Emergency Backup Generation Facilities

Generation facilities that are designed to supply power to a load if supply from the distribution system is lost, but not to feed power back into the grid or use for load displacement purposes.

Energy Meter

A meter which measures the total energy consumed over a period. This consumption is normally expressed in kilowatt-hours (kWh).

Energy Storage Facilities

Facilities designed to draw power from the grid during times of low demand and store it for eventual export back to the grid typically during times of high demand.

Electrical Safety Authority or ESA

ESA is a delegated administrative authority; an independent, not-for-profit corporation acting on behalf of the Government of Ontario with specific responsibilities for electrical safety. As part of its mandate, the ESA administers regulation in four areas: the OESC; licensing of Electrical Contractors and Master Electricians, electricity distribution system safety, and electrical product safety. The ESA also administers the Appeals Regulation.

Hydro One or HONI

Hydro One Networks Inc.

Independent Electricity System Operator or IESO

A not-for-profit corporate entity established by the Electricity Act, which operates the electricity grid in real time and oversees Ontario's Electricity Market.

Interval Meter

An electronic meter that measures and records electricity parameters and/or consumption on an hourly or sub-hourly basis.

Instrument Transformer

Voltage or Current Transformer that transforms the circuit voltage and current to lower levels for connection to a transformer type meter.

Instrument Transformer Enclosure

NEMA rated enclosures to house current and voltage transformers. Typically, these enclosures are 4' x 4' x 1' for three-phase metering and 3' x 3' x 1' for single-phase metering. For enclosure or compartment used in Switchgear/Switchboard, refer to Utility Metering Compartment.

Load Displacement Generation Facilities

Generation that is used to supply part or all a Customer's electricity needs. The generator is located behind the meter that measures the Customer's electricity supplied by the distributor.

Load Side

The part of the line or electrical installation located between a given point and the load.

Location

- **Outdoor Location:** Any location outside of a building or enclosed structure, exposed to the weather or in other words, if the location is sheltered from the weather, it shall not be considered outdoors.
- **Indoor Location:** Any location that is not an Outdoor Location is considered an Indoor Location.

Local Distribution Company

A distribution company that is responsible for distributing power from transmission lines to residential, industrial, and commercial Customers.

Main Service Box

An assembly consisting of an enclosure that can be locked or sealed, containing either fuses and a switch, or a circuit breaker, and designed so that it is possible to operate either the switch or circuit breaker to the open position by manual means when the box is closed.

Maximum Demand

The highest demand measured over a selected period, such as one month, and referred to as peak demand.

MCM

Is an abbreviation for thousands for circular mils, an old measurement for wire gauge.

Measurement Canada or MC

The Federal Government authority responsible for revenue metering regulations in Canada, formerly known as Industry Canada and Customer and Corporate Affairs Canada (CCAC) - more information can be found at <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/Home> or 1-877-325-3996

Meter Centre

A modular metering solution accommodating compact, group metering applications, typically used in commercial or high density residential areas.

T/R Meter-Mounting Enclosure

Outdoor rated metal enclosure to house a transformer type meter, test switch, fusing, wiring and associated equipment.

Meter Installation

The meter and, if so equipped, the instrument transformer(s), enclosure or compartment housing the instrument transformers (IT), wiring, test links, fuses, lamps, loss of potential alarms, meters, data recorders, telecommunication equipment and spin-off data facilities installed to measure power, provide remote access to the metered data and monitor the condition of the installed equipment, whether or not such equipment is located in the immediate vicinity of the meter and includes, where applicable, AMI Network Equipment, and including all other equipment required for the Meter Installation.

Meter Multiplier

The actual amount of energy consumed is too large to be registered and the meter shows a fraction of the actual use. A multiplier is then applied to the difference between your present and previous readings to determine your actual energy use. The meter multiplier is determined by the meter manufacturer and is indicated on the meter nameplate. If the meter multiplier is X1, it may or may not appear on the meter nameplate. All meter multipliers other than X1 will appear on the meter nameplate.

Meter Socket

Device for mounting a self-contained S-Base meter. In addition, there are transformer type meter sockets that come with test switch compartments in various jaw configurations required to install Hydro One supplied test switches and meters for Transformer Type Metering. Both types of Meter Sockets are referred to as a meter mounting device **MMD** in the OESC.

Multiplier

A term used in metering circuits to express the ratio of instrument transformers or the rating on meters.

Meter-Mounting Device, MMD

A Meter-Mounting Device is a device for mounting a meter. A S/C MMD does not need a current transformer or voltage transformer. A T/R MMD works in conjunction with a current transformer and/or a voltage transformer. The load side is energized whether the meter is in place or not.

Multiple-Meter-Mounting Device.

A Meter-Mounting Device with a more than one meter position.

Multi-position Meter Sockets or Ganged Meter base Socket

A Multi-position, self-contained meter socket that houses Hydro One's meters. A Multi-Position Meter-Mounting Device may be either Horizontally or Vertically arranged.

National Electrical Manufacturers Association or NEMA

The National Electrical Manufacturer Association (NEMA) uses a standard rating system that defines the types of environments in which an electrical enclosure can be used, and frequently signifies a fixed enclosure's ability to withstand certain environmental conditions.

Net Metering

A special service or program where eligible Customers with specific generation facilities can reduce their energy consumption costs by exporting generated energy back into the distribution grid for a credit towards their energy use.

Network Meter Installation

A network service is a three-wire service supplied from a three-phase, four wire, wye distribution system, with one of the conductors being the neutral conductor, and the other two being phase conductors.

Neutral Ground Resistor or NGR

A resistor that has been installed between the transformer neutral and ground.

Ontario Energy Board or OEB

Regulates the province's electricity and natural gas sectors in the public interest.

Ontario Electrical Safety Code or OESC

The Ontario Electrical Safety Code is primarily a technical document that describes the standards for electrical installations in detail.

Point of Common Coupling or PCC

Point of supply or demarcation point where the primary live clamp or line switch that is installed on or at the Hydro One distribution line where the Generator's facilities are to connect to Hydro One's distribution system.

Point of Supply

The point of interconnection to Hydro One Networks Inc.'s Wholesale System for the purpose of metering. For example, "Point of Supply to Toronto Hydro" refers to a wholesale metering point for Toronto Hydro, the Municipal Utility. This may be located at Hydro One Networks Inc. owned stations or Customer owned stations.

Pony Pole

A pole used for Central Metering installation, when greater than 4 services are required.

Potential Transformer

See Voltage Transformer.

Primary Metering Unit or PMU

A specific type of equipment, either single or three-phase, consisting of instrument transformers connected to the primary distribution system. It consists of an assembly of individual VTs, CTs, and a bracket. May also be referred to as modular metering unit.

Pulse

An electrical signal which departs from an initial level for a limited duration of time and returns to the original level. For example, a sudden change in either the voltage or current in a digital circuit produced by the opening or closing of a contact and used to activate a counting device. In an electronic meter, each pulse represents a specific amount of energy that varies by meter model/type.

Retail System

Hydro One Networks Inc.'s electrical distribution system (less than 44kV) used to supply retail Customers.

Retail Customer

An end-use Customer served directly by Hydro One Networks Inc. and not a wholesale market participant (i.e., registered with the Independent Electricity System Operator).

'S'-Base

A type of meter with a standard arrangement of blades at the back of the meter, which fit into an ANSI standard socket base.

Self-Contained Meter, S/C

A meter designed to be connected directly in the Customers supply circuit, typically 100A or 200A. No instrument transformers are required. Also referred to as S/C within this document.

Service Type

The number of phases and wires and the interconnection between them. The three main Hydro One metering service types are defined below:

Single-phase:

- **Two-wire (2W) service:** typically has one conductor grounded (neutral) and a phase conductor, with a nominal voltage of 120V between them.
- **Three-wire (3W) service:** typically has one conductor (neutral) which is grounded and two-phase conductors with a voltage of 240V between them and 120V between each phase conductor and neutral.

Network: A network service is a three-wire service supplied from a three-phase, four-wire, wye distribution system, with one of the conductors being the neutral conductor, and the other two being phase conductors.

Polyphase:

- **Three-phase, three-wire (3W) service:** has no neutral conductor and may be supplied by either an open delta or closed delta transformer bank.

- **Three-phase, four-wire (4W) service:** has three-phase conductors and a neutral conductor where the phase-to-phase voltage is equal to the square root of 3 times the phase to neutral voltage.

Three-phase, four-wire, delta service: has one transformer winding which is centre tapped and grounded. The voltage between the two adjacent phases and the centre tap is 120V, and the voltage of the third phase to the two adjacent phases is 240V. The voltage between the third phase and the centre tap is 208V.

Service Upgrade

Changing an existing Meter Installation to comply with the latest metering standard.

Single Stage of Transformation

Voltage supplied to the Customer following a single step down after an initial step down at a Distribution Station.

Single Line Diagram or SLD

A simplified notation for representing a three-phase power system.

SMMD

Single-Meter-Mounting Device. A Meter-Mounting Device with a single meter position.

Single-phase

Refer to Service Type.

Smart Meter

A smart meter records how much electricity used based on when it was used (typically hourly) and communicates this information automatically via wireless and other technologies. In contrast, conventional electricity meters are read manually and measure only how much electricity is used between readings.

Surge Suppressor/ Arrestor

A device that is used to protect metering and telecommunications circuits from excessive or damaging voltage surges.

Test Switch

A device containing current and/or voltage isolating mechanisms, which are used to isolate meters from their current and voltage input sources.

Transformer (XFMR) Type Meter

A meter designed to be used with instrument transformers such as current and voltage transformers.

T/R

See Transformer-Rated Meter Installation.

Transformer-Rated Meter-Mounting Enclosure

A device for mounting a meter that works in conjunction with a current transformer and/or potential transformer. The load side is energized whether the meter is in place or not.

Transformer-Rated Meter Installation

Comprised of the meter, meter enclosure, the instrument transformers, instrument transformer enclosure, wiring, test switch, fusing and all associated equipment required for the Meter Installation. Also referred to as “T/R”.

Underwriters Laboratories of Canada or ULC

Underwriters Laboratories of Canada (ULC) is an independent product safety testing, certification, and inspection organization.

Utility Metering Compartment (UMC)

Enclosure or compartment that is used to house instrument transformers within a Customer owned switchgear or switchboard.

Voltage

- **Low Voltage** – Any voltage exceeding 30V but not exceeding 750V.
- **Medium Voltage** – Any voltage exceeding 750V but not exceeding 44kV.

Volt-amperes or VA

The mathematical product of voltage and ampere carried thereby.

Voltage Transformer or VT

An instrument transformer designed to reduce the measured voltage to a lower secondary value suitable for application of metering.

VT Ratio

The VT ratio is the primary voltage of the VT divided by the secondary voltage of the VT (e.g., For a VT rated at 4800V primary and 120V secondary, the ratio would be 40).

Wooden Post

A 6x6 wood post used mainly to mount a Meter Mounting Device for pad-mount central metering installation.