



# Instrument/Transformer Rated Meter Exchange - Energized State

Standard  
Operating  
Procedure

## Table of Contents

TABLE OF CONTENTS	1
1.0 PURPOSE	2
2.0 ROLES AND PREREQUISITES	2
3.0 TOOLS AND EQUIPMENT	2
4.0 PROCEDURE	3
5.0 COMPONENTS	7
6.0 ACRONYMS, DEFINITIONS AND SYMBOLS	7
7.0 POLICIES AND REGULATORY REQUIREMENTS	7
8.0 REFERENCES	8



# Instrument/Transformer Rated Meter Exchange - Energized State

Standard Operating Procedure

## 1.0 Purpose

This SOP provides:

The purpose of this document is to describe activities associated with qualified electrical workers, while conducting meter exchanges or removals for all instrument rated revenue meters with the operation of a circuit closer or test switch.

## 2.0 Roles and Prerequisites

Role(s)	Quantity Required	Prerequisites
Qualified Electrical Workers	1 or more	1. Clear understanding of the information contained within this SOP

## 3.0 Tools and Equipment

### Minimum Tools and Equipment Required:

- Required Personal Protective Equipment (PPE)
- FR clothing (as required by Arc Flash Tables)
- Arc rated face shield
- Minimum Class Zero rubber gloves
- Supply of meters, replacement seals and sealing rings
- Basic installation and test tools
- Anti-oxidizing Agent
- Fire Extinguisher (Accessible)
- Ladder (Accessible if required)
- Fall Arrest (Accessible if required)
- H2S Monitor (Accessible if required)

## 4.0 Procedure

### The Procedure

The following requirements shall be met prior to the start of the procedure:

- Complete Hazard/Aspect and Risk Assessment (HARA)
- Applicable Personal Protective Equipment (PPE) is available and in good condition
- Consider Environment Best Management Practices when accessing meter location
- Review of ARC Flash requirements

### 1.0 Prepare to use Personal Protective Equipment and Safety Equipment

- *Class Zero rubber gloves and face shield*
  - *Are to be used together while installing and removing the meter with a circuit closer*
  - *Are to be used together opening metering cabinet(s) door(s)*
  - *Are to be used together operating a test switch*
  - *Are to be used together performing testing*
- *Ladder*
  - *To be used if the meter/instrument transformers are above the workers reach*
- *Fall Arrest*
  - *To be used at heights over 6 feet (i.e. pole top metering, metering units on stands)*
- *Fire Extinguisher*
  - *Fire extinguisher must be readily available*

### 2.0 Identify Hazards that should Raise Awareness of the PLT/Metering Electrician

#### 2.1 Identify Hazards

2.1.1 QEW shall identify the following hazards, if present:

- *Meter socket and/or CT cabinet is not properly secured*
- *Meter socket cover is broken, improperly placed or missing*
- *Missing seal or ring or condition of the ring*
- *Face-plate information found indicates a different form type*
- *CT cabinet with a non-hinged access door*
- *Pad-mount or substation metering (May have higher risks)*
- *Conduit is pulled out of the bottom of the Meter socket/splitter*
- *Socket adapter is installed (remove adapter from socket and not the meter from adapter while on the socket)*
- *The condition of the instrument transformers (cracked, burn marks, stands, oil level or leaks in metering units)*
- *Identify if any holes in the meter box/cabinet/metering units (install plug to seal)*

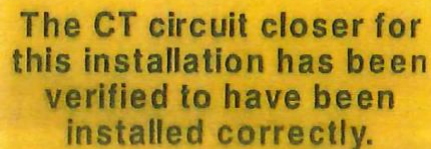
**Caution** - The voltage jaws will remain energized during the socket inspection and meter exchange with a circuit closer. Full PPE with face shield must be down during the removal and installation of the meter and covers

**Caution** – For older single phase services over 200 amps, certain wiring applications used an A-Base socket adapter. The CT(s) shall be shorted out prior to replacement of the meter. There is NO circuit closer in the A-Base socket adapter. (Reference drawings CD233, CD234, and CD236) Full PPE with face shield lowered to close and open the shorting bar on the CT(s). Remember to open the CT bar after the meter exchange has been completed

**Caution** - 240V three-phase 3-wire instrument rated services wired to CD250 and 120/240V three-phase 4-wire instrument rated services wired to CD 274 with an 8 jaw meter - this socket will not have a test block. The socket will have circuit closures built into it to short out the CTs upon removal of the meter (review CD250). Best practice is to close CT shorting bar(s) if safe. Older sockets may have broken shorting devices

2.1.2 QEW shall ensure to identify hazards that require isolation of service

- *Burn marks or other evidence of previous ground faults*
- *Obvious evidence of tampering*
- *Any rewiring needs to be done in the isolated state. For services above 750 volts, grounding will be required on line and load side of the metering transformers*
- *If the Yellow CT verification sticker is not present on meter sockets with circuit closers or if unknown, manually short out the CT(s) or have the meter or service isolated*



The CT circuit closer for this installation has been verified to have been installed correctly.

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**Note, some installation may not have a circuit closer or the circuit closer may be damaged. In these cases removing the meter without shorting the CT's, could cause the CT's to rupture**

2.2 QEW's responsibilities for identified hazards and perform the following repairs

- Repairing/replacing socket jaws and circuit closers
- Rewiring the secondary wiring
- Replacing of instrument transformers
- Repairing/replacing phone line jacks and modems (MV90)

### 3.0 Prepare for Process if Ground Fault Occurs



## Instrument/Transformer Rated Meter Exchange - Energized State

Standard  
Operating  
Procedure

3.1 QEW's responsibility if ground fault occurs.

- *QEW shall ensure the following steps are performed if a ground fault occurs during exchange of meter(s). This process will be used in all cases - Overhead, Underground, Apartments*
  - *Step back*
  - *If the ground fault clears itself immediately isolate the installation if possible or contact district to isolate*
  - *If the ground fault does not clear itself immediately:*
    - *If necessary (fire, flames or excessive smoke) activate the EMS (call 911)*
    - *Evacuate the building if occupied*
    - *If necessary (fire, flames or excessive smoke) and safe to do so deploy the fire extinguisher*
    - *Isolate the installation if possible*
  - *Notify your Supervisor who will activate SaskPower Incident Command system protocols if required*

### 4.0 Prepare to Exchange Transformer/Instrument Rated Meter(s)

4.1.1 QEW shall ensure the following steps are performed before exchanging Transformer/Instrument rated meters on Overhead or Underground Electric Services

- *Verify the correct address (location)*
- *Review HARA*
- *If possible, inform the customer of the meter exchange and advise the power should not be interrupted unless service is required to be isolated*
- *Verify communication with MV90 if required*
- *Verify meter number with meter number on work order*
- ***Verify old and new meter corresponds to the applicable CD Drawing. DO NOT CHANGE THE METER IF INCORRECT*** *If the incorrect meter is installed it will likely affect the customer's billing. If possible have the owner of the account present for you to explain the error. A meter investigation report will need to be created for the Yorkton Customer services for the billing error*
- *If there is a wiring issue or shorted CT, correct and leave the existing meter in place and include in meter investigation report*
- *Verify that billing multiplier and all face plate information on the meter to be exchanged and the new meter to be installed are the same stock code or approved alternate from the meter substitution list*



## Instrument/Transformer Rated Meter Exchange - Energized State

Standard Operating Procedure

- *Confirm billing multiplier matches information on provided click mobile task and in IQ03 SAP transaction*

**Note:** All pictures should be captured with the MEX App. If required, pictures can be emailed to [metertechdispatch@saskpower.com](mailto:metertechdispatch@saskpower.com)

- **Picture #1** - *From a few paces back, capture digital image(s) of the meter socket, showing the entire socket and the CT cabinet and/or metering unit(s)*
- **Picture #2** - *Capture a digital image(s) of the existing meter with Kilowatt hour read(s) and demand read if required*
- *Document all out readings in provided click mobile task*

### 5.0 Exchanging the Transformer/Instrument Rated Meter

5.1 QEW shall perform the following steps when exchanging transformer/instrument rated meters:

- *Check for hazardous conditions*
- **If hazardous conditions exist, perform meter exchange in isolated state**
- *If hazardous conditions do not exist, proceed to exchange the meter*
- **Meter exchange with a circuit closer:**
- *Ensure proper PPE is on and used appropriately*
- *Insulated class zero rubber gloves, appropriate FR clothing(as per Arc Flash requirements), and face shield lowered during removal and replacement of the meter opening or performing work in the CT cabinet and/or meter box*
- *If safe to do so, perform Test and Complete (record results on test sheet)and verify the wiring and voltages complies with the applicable CD Drawing*
- *If safe to do so, open the CT cabinet and verify the CT shorting bars are in the open position and that the instrument transformers are not damaged. If there are errors here it may also affect the customer's billing*
- **Picture #3** - *Capture an image of the available CT(s) and PT(s)*
- *Close the CT cabinet door(s)*
- **Note:** *If CT cabinet or metering unit(s) cannot be accessed or is unsafe to access in the energized state, add remarks in the work order and continue to exchange the meter. An outage or appointment to do the work will be required if the CT cabinet and/or metering unit(s) is to be accessed*
- *Remove the sealing ring*

## Instrument/Transformer Rated Meter Exchange - Energized State

- *Remove the meter standing to the side, pull in a downward motion to disengage the top jaws and roll the meter downward until it is free from the meter jaws. If the circuit closer does not work or is not present quickly reinstall the meter. You may hear the CT "hum", this is an indication there is no circuit closer or it is broken*
- *Once the meter is removed, and if required you can remove the socket cover and visually inspect the internal components of the socket for any "abnormal conditions" (i.e. broken or cracked porcelain or bakelite, broken jaws, any condition which would lead you to suspect there is potential for a "Ground Fault", etc.). If abnormal conditions isolate the installation. (NOTE: Socket remains energized when meter is removed)*
- **Picture #4** - *Capture a digital image of the meter socket to show the condition of the socket jaws and wiring*
- *Confirm socket wiring is correct as per CD drawing. If there are any errors here it may also affect the customer's billing*
- *Confirm operation of socket circuit closer, located on left side jaws*
- *If able to confirm operation of circuit closer, place yellow CT Circuit Enclosure Verification sticker if not present*
- *Check for any signs of energy diversion (theft) if found initiate the Energy Theft Process*
- *Ensure connections are snug with an insulated tool (voltage jaws will be energized)*
- *If socket adapter is required, install meter to socket adapter and then secure to socket. (ensure the adapter is installed right side up)*
- *Prior to installing the new meter, anti-oxidizing lubrication shall only be applied to the blades on the back of the new meter and/or adapter*
- *Mark the billing multiplier "on the meter". (Use the red billing multiplier sticker if outdoors)*
- *Install new meter, line up voltage jaws first and install with a firm pushing motion. This will insure no damage occurs to the CT shorting tang*
- *Replace sealing ring*
- *Confirm meter goes through boot up sequence*

### **Meter exchange with test switch:**

- *Ensure proper PPE is on and used appropriately*
- *Work Being performed in the Meter Socket:*
  - *Insulated class zero rubber gloves, class 2 FR clothing, and class 2 face shield lowered during the opening of the test switch compartment, operation of test switch and any testing on energized equipment*

## Instrument/Transformer Rated Meter Exchange - Energized State

- *Work Being Performed in the CT Cabinet or Splitter Box:*
  - *Class zero rubber gloves, appropriate FR (as per Arc Flash requirements) and face shield to be lowered during the opening of the cabinet door and any testing on energized equipment*
- *If safe to do so, perform Test and Complete (record results on test sheet) and verify the wiring and voltages complies with the applicable CD Drawing*
- *If safe to do so, open the CT cabinet and verify the CT shorting bars are in the open position and that the instrument transformers are not damaged. If there are errors here it may also affect the customer's billing*
- **Caution:** *CT cabinets and/or metering unit(s) are not to be opened in the energized state above 750 volts. If CT cabinet and/or metering unit(s) cannot be accessed in the energized state or is inaccessible, add remarks in the work order and continue to exchange the meter. An outage or appointment will be required if the CT cabinet and/or metering unit(s) is to be accessed*
- **Picture #3** - *Take a picture of the available CT(s) and PT(s)*
- *Close the CT cabinet door(s)*
- *Open test block compartment*
- *Ensure all connections are snug in the test block with an insulated tool*
- **\*VERY IMPORTANT\*** *Open all voltage and current test switches on test block before exchanging meter with class 0 rubber gloves and arc flash shield in lowered position*
- **NOTE:** *The bottom of the test block will remain energized*
- *Cut seals on meter socket*
- *Remove the sealing ring*
- *Remove the meter, pull in a downward motion to disengage the jaws and roll the meter downward until it is free from the meter jaws*
- *Once the meter is removed, if required, you can remove the socket cover and visually inspect the internal components of the socket for any "abnormal conditions" (i.e. broken or cracked porcelain or bakelite, broken jaws, any condition which would lead you to suspect there is potential for a "Ground Fault", etc)*
- **Picture #4** - *Capture a digital image of the meter socket to show the condition of the socket jaws and wiring*
- *Confirm socket wiring is correct as per CD drawing. If there are any errors here it may also affect the customer's billing*
- *Check for any signs of energy diversion (theft) if found initiate the Energy Theft Process*



- *Ensure the connections are snug*
- *Prior to installing the new meter, anti-oxidizing lubrication shall be applied*
- *Mark the billing multiplier "on the meter". (Use the red billing multiplier sticker if outdoors)*
- *Install new meter, line up the lower jaws first and install in an upward rotation with a firm pushing motion*
- *Close test switches*
- *Ensure the new meter boot up sequence is completed*

### 5.2 Post meter exchange

- *Perform Test and complete for new meter and record results on test sheet*
- ***NOTE: If any errors are found, a test sheet will need to be completed showing the test in error state and in fixed state. A meter investigation report will also need to be completed. Software downloads of the meter may also be required prior to and after any fixes***
- *Replace all covers and seals (meter, demand, cabinet)*
- *Press plunger in to ensure demand reading is set to zero and clear previous errors*
- *Ensure there are no error codes on the meter. If error exists, determine the cause of error or diagnostic. Adjust the parameters if necessary based on the customers operating conditions*
- ***Picture #5-*** *Capture a digital image(s) of the new meter(s) showing the kilowatt hour read*
- *Document the new meter exchange information in the provided click mobile task*
  - Record the meter number
  - Record the kwh reading(s)
  - Record the billing multiplier
  - Record demand; Should be 0
  - Record location
  - Record hazard
  - Record Meter Use
  - Record Volt Code
  - Record CDNO
  - Record APR
- *Clean-up the area as necessary*
- *Conduct post install inspection of the area/building for evidence of property damage*



## Instrument/Transformer Rated Meter Exchange - Energized State

Standard Operating Procedure

- *Inform the customer that you are leaving the property. If unable to inform customer, leave applicable door hanger*

### 5.0 Components

The following is a list of components for this SOP which can be accessed through the SOP System:

Component Name	Component Type	Component Description	Location of Component
N/A			

### 6.0 Acronyms, Definitions and Symbols

#### Acronyms and Abbreviations

**FRC** - Flame Retardant Clothing

**PLT** - Power Line Technician

**EMS** - Emergency Medical Services

**HARA** - Hazard/Aspect and Risk Assessment

**APR** - Active Primary Ratio

**ICS** - Incident Command System

**QEW** - Qualified Electrical Worker

**CDNO** - Connection Diagram Number

#### Definitions

##### Qualified electrical worker - Occupational Health and Safety Regulation 465 (c)

*(i) the holder of a journeyperson's certificate in the electrician trade issued pursuant to The Apprenticeship and Trade Certification Act, 1999, and includes an apprentice in the trade while under the supervision of a journeyperson;*

*(ii) the holder of a journeyperson's certificate in the power lineperson trade issued pursuant to The Apprenticeship and Trade Certification Act, 1999, and includes an apprentice in the trade while under the supervision of a journeyperson; or*

*(iii) for the purpose of design, calibrating of equipment, inspection, monitoring, testing, and commissioning of equipment in high voltage*



## Instrument/Transformer Rated Meter Exchange - Energized State

Standard Operating Procedure

*installations, electrical engineers, applied science technologists or certified technicians who have achieved professional certification within an electrical, electronics, industrial or instrumentation discipline*

**Personal Protective Equipment** - PLT shall ensure the following **Mandatory PPE** is used and in good condition

- **Head Protection** - CSA approved head protection shall be worn by all personnel at the job site, work areas and in posted areas on site
- **Eye Protection** - Approved safety glasses with side shields shall be worn by all personnel at the job site
- **Clothing** - Minimum Class 2 FR/Class 2 High Visibility Clothing shall be worn by all personnel at the job site
- **Footwear** - CSA approved, electric shock resistant footwear with minimum six inch (6") leather uppers for ankle support and a steel or composite toe
- **Hand Protection** Class Zero rubber gloves to be worn during the meter exchange
- **Face Protection** - FR Rated Face shield required

**Additional PPE Requirements** - To be determined according to the requirements of the task being performed. (Face Shield, rubber gloves, additional FR as determined using the SaskPower Arc Flash Tables) Review the procedure above for additional PPE requirements

### Symbols

N/A

## 7.0 Policies and Regulatory Requirements

This SOP is a result of the following regulations, policies, industry standards, and corporate directives and standards:

### Regulatory Requirement(s)

- Saskatchewan Occupational Health & Safety Act and Regulations, 1996
  - *Section 465 (c) Qualified Electrical Worker*

### Policies

- Hazard/Aspect and Risk Assessment Policy
- Personal Protective Equipment Policy
- Working Alone Policy

### Standards

- Personal Protective Equipment Standard
- Hazard/Aspect and Risk Assessment Standard



## Instrument/Transformer Rated Meter Exchange - Energized State

Standard  
Operating  
Procedure

- ARC Flash Standard
- Deviation from Safe Work Procedures Standard

### 8.0 References

#### References

CAN/ULC-S801-14  
Electric Service Requirements  
Revenue Metering Connection Diagrams Manual  
Safety and Environment Rulebook  
Environmental Best Management Practices  
Test for Absence of Potential SOP  
Test and Complete SOP  
Arc Flash Tables