# Wire Requirements

You are responsible for furnishing, installing, and maintaining all required service entrance equipment, including the service conductors from the meter base or instrument transformer enclosure to Central Lincoln's designated point of delivery. For services where instrument transformers (CTs and PTs) are required, you will also need to run 1 ¼" conduit from the instrument transformer enclosure to the meter base. Central Lincoln will supply the instrument transformers and meter wiring. Conduit shall not contain LBs or junction boxes.

The number and size of secondary wires must be approved by Central Lincoln.

This chapter gives you information on Central Lincoln's metering requirements. It's divided into three sections:

- General Requirements: This section contains the requirements that pertain to all meter installations such as meter location, clearances, and multiple meter installations.
- Self-Contained Metering: This section contains the requirements for single-phase service up to 400 amps and three-phase service up to 200 amps.
- Instrument Transformer Metering (CTs and PTs): This section contains the requirements for single-phase service over 400 amps and three-phase service over 200 amps.

# General Requirements

# Removing and Installing Meters

Only authorized and qualified Central Lincoln personnel shall cut seals, and remove or install meters.

# Equipment

Instrument transformer (CT and PT) enclosures, switchgear, gutters that contain unmetered conductors, and metering equipment shall have provisions for sealing. Central Lincoln meter department will remove seals for any future inspections that become necessary.

Central Lincoln will furnish, install, and maintain the following equipment:

- Revenue meters

- CT meter wiring
- Test switches

Central Lincoln will furnish and maintain the following equipment:

- Instrument transformers (current or voltage)

The customer will be responsible for furnishing, installing, and maintaining the following equipment beyond the point of delivery:

- Meter bases*
- All necessary wiring (except CT meter wiring), connectors, and lugs
- Disconnect switches
- Enclosures*
- Conduit
- Protection equipment

*Central Lincoln strongly recommends stainless steel meter bases and CT enclosures.

## Load Balancing

When 120/208 three-phase transformers provide single-phase service, it is the customer's responsibility to identify the conductors and balance the load on the transformer. The customer is responsible for providing protection for their equipment against single-phasing.

# Available Fault Current

It is the customer's responsibility to ensure that any fault current interrupting devices installed meet all requirements regarding interrupting rating. Central Lincoln can provide information on available fault current at the point of delivery for the original system installed. However, system changes can cause the available fault current to increase.

# Meter Location

You are required to install your metering equipment in a place that is accessible to Central Lincoln during normal business hours for maintenance, testing, installation, and removal. All locations are subject to approval by a Central Lincoln representative. If you have questions regarding meter location, contact Central Lincoln.

The requirements for properly locating your meter base:

- Outside your building
- In an area that is not subject to being fenced or blocked in any way
- Located on a structure that is owned by you
- Meters shall be protected from mechanical damage

The reasons for these requirements are:

- To allow Central Lincoln safe access to your equipment
- So Central Lincoln can efficiently maintain your meter

- If you have a fire, we can quickly and safely disconnect your service

Meters shall not be installed at any of the following locations:

- Above or below the first story level of any building
- On poles owned by Central Lincoln or another utility
- In commercial occupancies they do not serve
- In a recessed opening (recessed meter bases are not allowed. All flush-mounted meter bases shall be set with the meter and meter base cover fully accessible. See Figure D-1b)
- Any place safety may be compromised

## General Meter Base Requirements

Due to the corrosive climate along the Oregon Coast, we recommend that you use a corrosion-resistant meter base that is state approved.

Central Lincoln's meter base requirements include the following:

- Meter bases will be ring-style
- Meter bases shall not be jumpered to provide power
- Any meter base containing energized equipment shall be covered and sealed with a cover plate when a meter is not installed

- All unused openings (knockouts) of the meter base enclosure shall be closed with plugs that are locked tightly in place from inside the enclosure before a meter is installed
- Meters shall be installed only in bases that are level, plumb, and securely fastened to the structure
- Terminals shall be marked with a conductor range for aluminum or copper conductors. When aluminum conductors are used, the base must be approved and clearly marked by the manufacturer for that use.
- All 320 amp meter bases shall have manual bypass provisions
- All meter equipment exposed to weather shall be rain-tight
- Commercial self-contained meter bases shall have manual bypass provisions
- No lever bypasses are allowed

# Approved Meter Base Reference List

## Single Phase

| AMPERE | DESCRIPTION | REFERENCE NUMBER |
|---|---|---|
| 100 | For 120V 2 Wire Service<br>4 Jaw<br>Ring Type<br>No Bypass Required | 011 |
| 200 | For 120/240V Service, 4 Jaw<br>Also for 120/208V Service, 5 Jaw (Use 5th Jaw Kit REF # 50365)<br>3 Wire<br>Ring Type<br>No Bypass Required | U204 |

| | | |
|---|---|---|
| 320 | For 120/240V Service Only<br>3 Wire<br>4 Jaw<br>Ring Type<br>Manual (Link-Style) Bypass Required | 324N |
| CT Service 20 | For 120/240V Service Only<br>3 Wire<br>6 Jaw<br>Ring Type<br>Lower Section has Test Switch Mounting Provision<br>*Minimum 30-inch by 30-inch CT enclosure with Reference Number 6019 CT Bracket required for this installation. Use 1.25-inch conduit. | 12146 |

## Three Phase

| AMPERE | DESCRIPTION | REFERENCE NUMBER |
|---|---|---|
| 200 | For 120/240V or 120/208V Service<br>4 Wire<br>7 Jaw<br>Ring Type<br>Manual (Link-Style) Bypass Required | U267 |
| CT Service 20 | For All Service Voltages<br>4 Wire<br>13 Jaw<br>Ring Type<br>Lower Section has Test Switch Mounting Provision<br>*Minimum 36-inch by 36-inch CT enclosure with Reference Number 6067 CT Bracket required for this installation. Use 1.25-inch conduit. | 121413 |

- All bases shall be ring-type.
- No lever-style bypasses will be permitted.

- As long as the meter base meets CLPUD minimum standards, any brand of meter base may be used. Due to the environment of the Oregon Coast, stainless steel is recommended but is not required. For any questions or approvals, please call the Central Lincoln meter shop at (541) 574-3608.

# Meter Clearances

The center of the meter is always the point of reference.

- Meter base height shall be a minimum of 5 feet and a maximum of 6 feet above floor or finished grade (see Figure D-1a). A flush-type meter base may be used so long as siding does not cover or overlap the cover.
- Working space in front of metering equipment (including current transformer enclosures) shall be at least 36 inches wide and 36 inches deep, measured from the front of the enclosure and meters. Plants, shrubs, and trees shall not be planted in this space. Gas meters shall be at least 36 inches horizontally from the center of the meter or edge of the CT enclosure (see Figure D-1a).
- The center of all meters shall be a minimum of 18 inches from adjacent walls, ceilings, or other similar obstructions. All service equipment, including disconnect switches, shall be a minimum of 18 inches from the meter's center (see Figure D-1a).

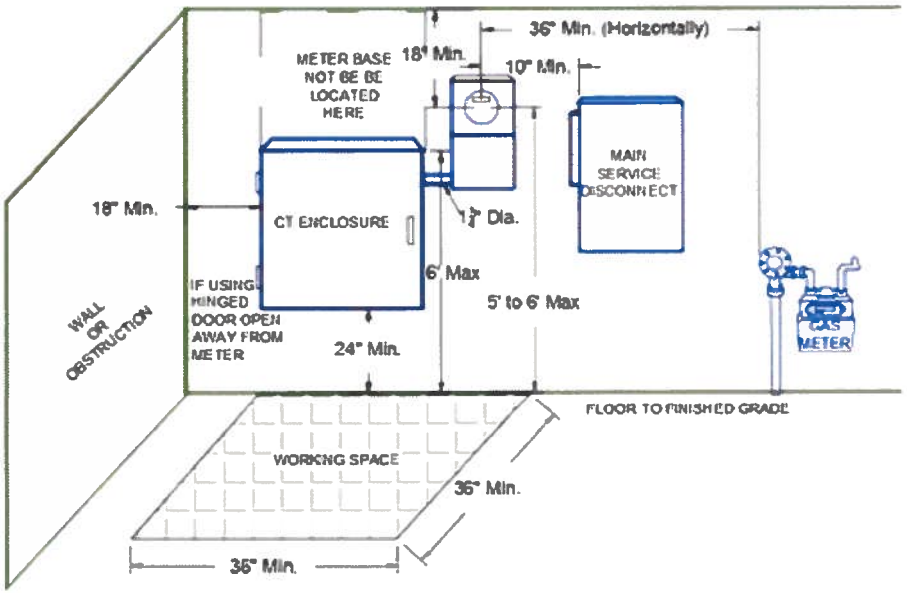



**Figure D-1a: Meter base height, minimum clearance, and gas meter clearance.**

**Figure D-1b: Flush-mounted meter base installation**

# Meter Base Labeling

Meter bases shall be permanently labeled to indicate the part of the premises they service (i.e. unit number). The customer's name is not acceptable. Central Lincoln requires engraved phenolic nameplates at least one inch high and able to withstand severe weather conditions. Felt tip pens and label maker tape are not considered permanent markings. Service will not be established until marking is complete (see Figures D-2 & D-3).

# Multiple Meter Installations

Multiple meter installations shall comply with the equipment arrangement requirements shown in Figures D-2 and D-3.

# Factory-Built Multiple Meter Panel

- Prior to ordering from the factory, the contractor shall submit non-residential multiple meter panel drawings to the Central Lincoln Meter Department for approval and installation requirements. All meter bases will be ring-style.
- Both residential and non-residential multiple-meter panels are shown in Figure D-2. The socket center line will be a minimum of 3 feet and a maximum of 6 feet above the floor or finished grade.
- On non-residential multiple panels (as shown in Figure D-3), the minimum spacing between meter sockets shall be 12 inches horizontally, 12 inches vertically, and the meter will be a minimum of 5 feet and a maximum of 6 feet above the floor or finished grade (see Figure D-1a for clearances).

# Service Conductors

Customer load conductors shall not enter or pass through raceways, pole sections, or enclosures containing unmetered conductors.

# Customer Load Monitoring

The customer's load monitoring equipment shall be installed only on the load side of Central Lincoln's metering.

No customer equipment shall be allowed inside the meter or instrument transformer enclosure. The instrument transformer enclosure is not to be used as a splice box.

# Current Limiting Fuses

Current limiting fuses to protect the customer's electrical system from high fault current shall not be installed in meter bases, instrument transformer enclosures, or in Central Lincoln's distribution transformers. They may be installed in the customer's service panel, or in a separate enclosure between the meter base and the panel. The separate enclosure may be on the supply side of the meter bases in multiple meter installations if the enclosure has sealing provisions.

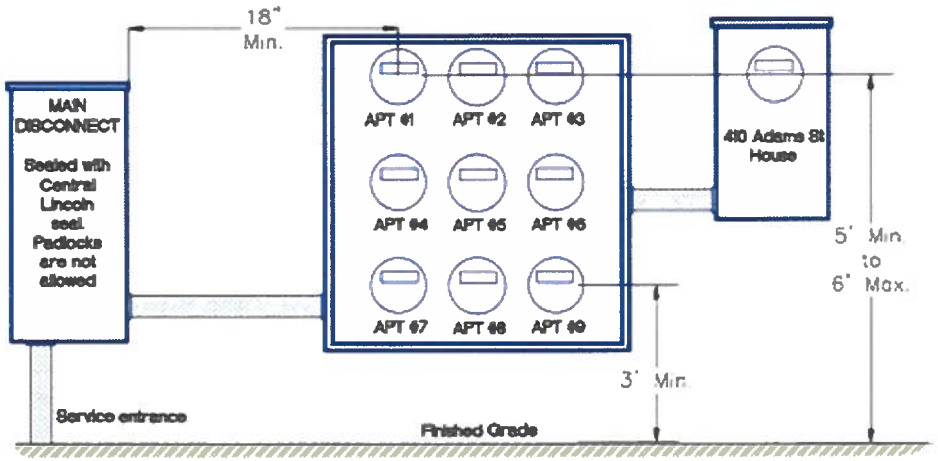



**Figure D-2: Typical factory-built multiple meter assembly for an apartment complex**

# Self-Contained Metering

The bending radius of the underground service conductors requires that off-center knockouts in the bottom of the meter base enclosure shall be used on all underground services. The center knockout shall not be used. If the ground lug is not located in the center of the base, the knockout on the opposite side of the enclosure shall be used.

## Single-Phase Services: 200 Amps Or Less

A self-contained meter base shall be installed on all new and remodeled single-phase services (120/240V or 120/208V), where the current carrying capacity of the service conductors does not exceed 200 amps, as specified (see Figure D-4).

## Single-Phase Services: 201 To 400 Amps

A self-contained 400-ampere meter base with a link-style bypass is required on all new and remodeled single-phase services over 200 amps (120/240 V), where the current carrying capacity of the service entrance conductors does not exceed 400 amps (see Figure D-4). Meter bases will be 324N or equivalent. Lever-style bypasses are not allowed.

Automatic circuit closure devices are not permitted.

Service conductors shall be arranged in the base to avoid interfering with the meter installation or operation of the link-style bypass.

## Single-Phase (0-200 Amps) 120/208 Volt Service

A five-terminal meter base is required on all single-phase 120/208-volt services. The fifth terminal shall be in the nine o'clock position and shall be connected to the socket neutral conductor. This meter is referred to as a network meter (see Figure D-4-D).

# Three-Phase (0-200 Amps) 120/240 and 120/208 Volt Service

A seven-terminal meter base is required on all 120/240 Delta or 120/208 Wye self-contained services. The neutral (grounded conductor) shall be connected or tapped into the third terminal from the left on the lower terminal row (see Figure D-4-E). The "wild leg" is on the right-hand terminals and marked with orange tape.

Link-style bypasses are required on all commercial applications.

# Three-Phase 277-480V – All Loads

All new 480-volt service installations must be a 4-wire Wye and shall be metered with instrument transformers.

No self-contained meters are allowed.

Note: No self-contained 277/480 meters allowed. Multiple meter installations for services of 200 amps or less. More than six meters requires a main disconnect. Meters must be sealable.

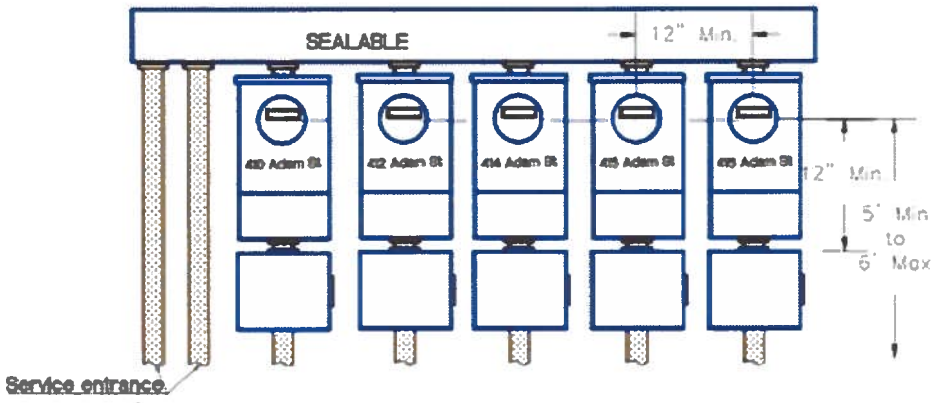



**Figure D-3: Multiple meter installations for an office complex**

# Meter Base/Main Disconnect Combinations

Meter base and circuit breaker combinations are acceptable for 0-400 amps single-phase (except 120-208 volt), and 0-200 amps three-phase, provided the meter base section meets Central Lincoln's link-style bypass and dimensional requirements.

Figure D-4 shows the necessary non-residential meter base types for specific voltage and amperage ratings.

# Sequence of Equipment

All self-contained service equipment shall be metered ahead of the disconnect switch unless it is a gang-style meter base.

# Service Conductors for Self-Contained Metering

- Line side conductors shall always be connected to the top terminals of the meter base
- Service conductors shall be arranged in the meter base to avoid interfering with the meter installation or operation of the link-style bypasses
- The customer is responsible for ensuring that the connection of service entrance conductors in the meter base is inspected and tightened before the service is energized. Meters shall not be installed unless these connections are tight and wired correctly for the class of service involved.
- Meters shall not be installed if conductors place undue strain on the terminal facilities
- Terminals shall be rated for the size of conductor to be used. Strands shall not be removed to make conductors fit undersized terminals.

- The “wild leg” conductor on a Delta service shall be located on the top right side of the meter socket and marked with orange tape (see Figure D-4-E)

# Instrument Transformer Metering

Provisions for current transformers shall be made when the current carrying capacity of the service entrance conductors exceeds 400 amps single-phase or 200 amps three-phase. Any installation supplying 480V shall make provisions for voltage transformers.

*The high leg (power leg) of a four-wire delta circuit must be connected through the right-hand terminals of the socket. Also, the high leg (208 volts, phase-to-ground) must be identified in orange in the meter base and at the weatherhead, for overhead services, and at the transformer or hand hole for underground services. This is done in addition to the grounded conductor.

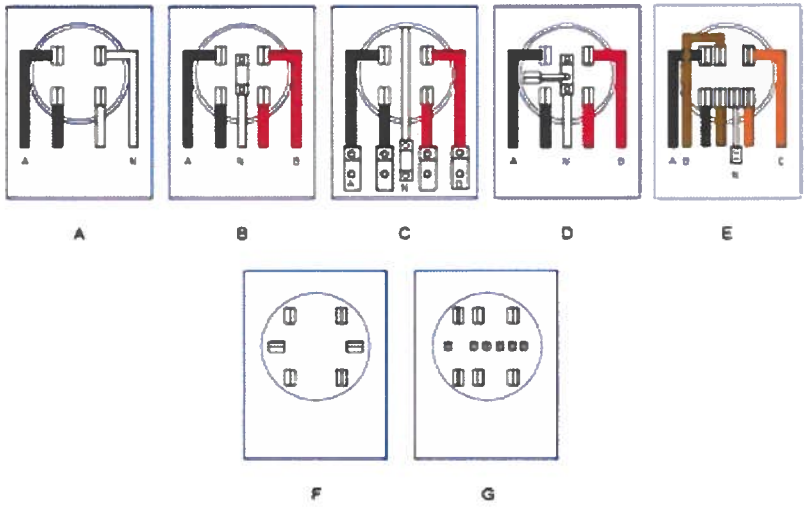
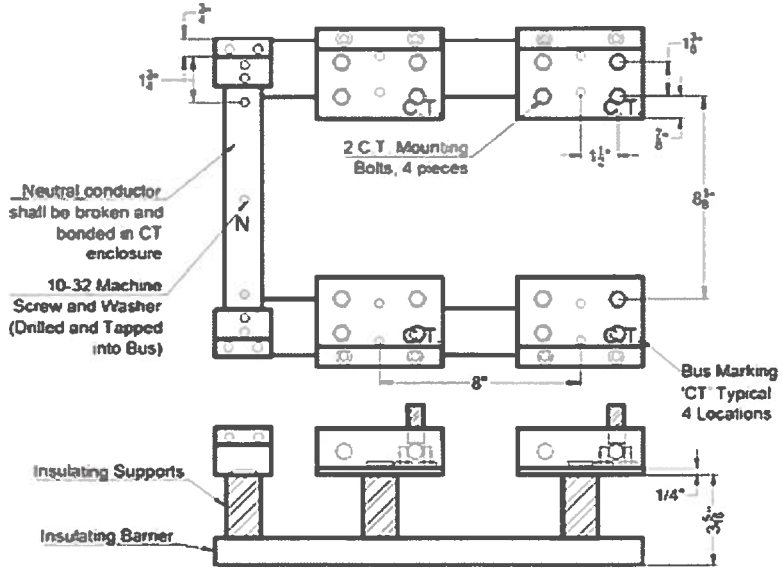



**Figure D-4: Illustrations A– E are self-contained meter bases. F & G are for instrument-rated meter bases.**

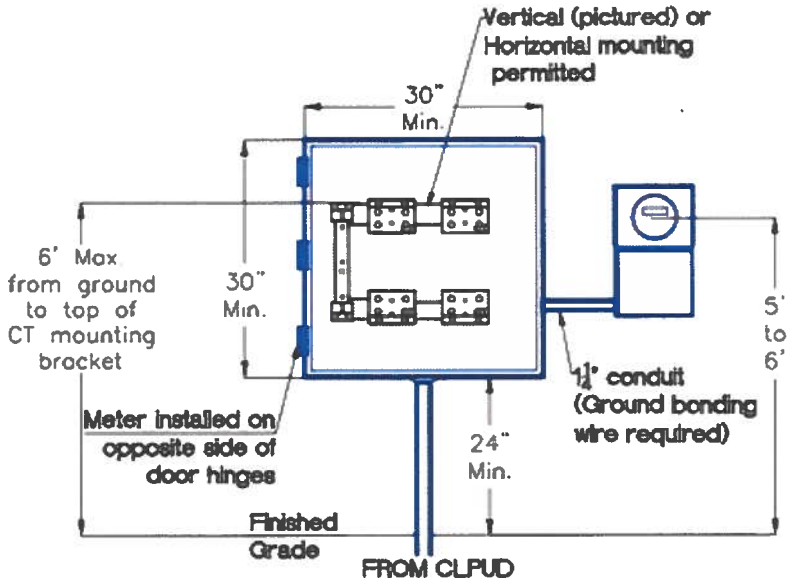
# Customers Responsibility

Customer shall provide and install an instrument transformer (CT) enclosure on the supply side of the main disconnect; on the outside of the structure, or in an approved electrical room.

- All CT enclosures require a minimum front clearance of 36 inches (see Figure D-1a). Hinged CT doors shall not block a safety exit while open.
- The top of the CT enclosures shall be a maximum of 6 feet above the ground level or finished grade. The bottom shall be a minimum of 24 inches above the ground level or finished grade. CT can shall be on the outside of the building.
- The cabinet must be mounted in a readily accessible location acceptable to the Central Lincoln metering department.
- Meter sockets shall not be located above the CT cabinet due to safety of working in front of live bus and shall not be located behind the hinged door.



## Figure D-5a: Single-phase cabinet installation




## Figure D-5b: CT Cabinet Installation – Option A

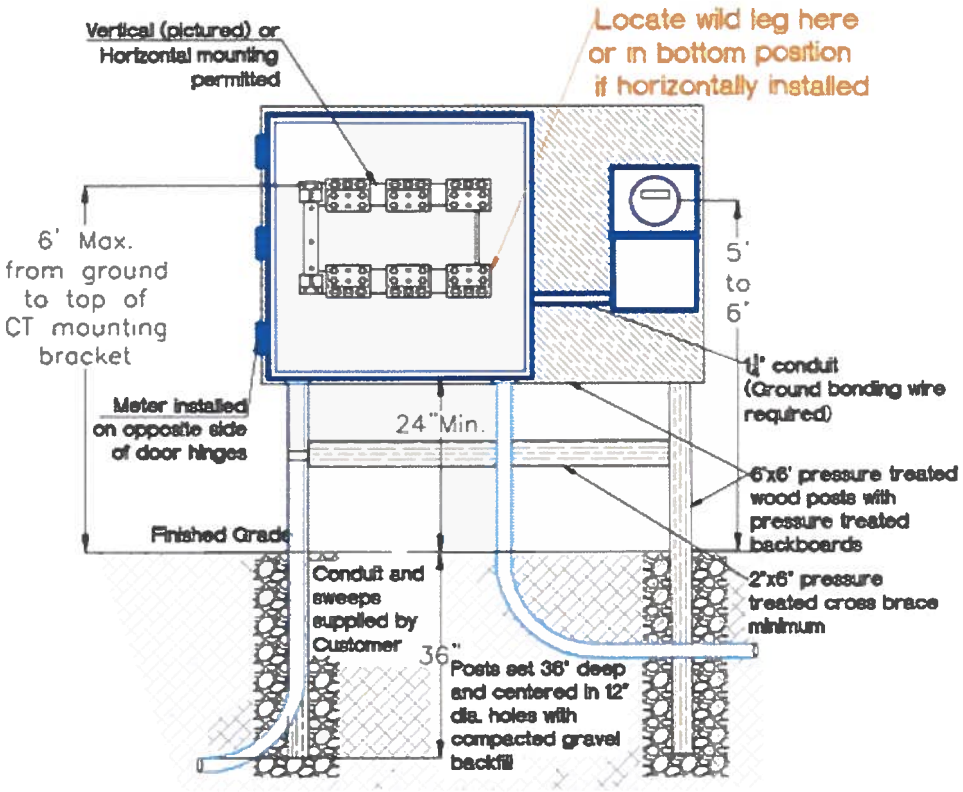



**Figure D-5c: CT Cabinet Installation – Option B**

# Table 1: CT Enclosure Minimum Dimensions

| Service | Switch Ampacity | Number of CTs | Enclosure | | |
|---|---|---|---|---|---|
| | | | Ht. | Width | Depth |
| 1-phase | 201-800 | 2 | 30" | 30" | 11" |
| 3-phase | 201-800 | 3 | 36" | 36" | 11" |
| 3-phase | Over 800 | 3 | * | | |

*Services over 800 amps require approval from the Central Lincoln meter department prior to ordering switchgear. Refer to the switchgear metering section for more information.

- The customer shall provide and install a transformer landing base for bar type CTs
- The top of the CT mounting bracket shall not be more than 6 feet above floor level
- The customer is to supply and install all lugs and connect the line and load conductors in the CT enclosure
- The customer will transport Central Lincoln provided instrument transformers from the meter department to the project site. Installation of instrument transformers is the customer's responsibility.
- Only conductors associated with a single meter shall be permitted in the current transformer enclosure. No connections shall be made in any current transformer enclosure to supply another meter.
- Customer's conductors will not be permitted in the Central Lincoln terminating and pull spaces
- The neutral shall be split and bonded to the CT enclosure and meter base
- For 4-wire Delta services, the power (wild) leg conductor must be identified by orange marking and located on the right-hand side of the CT mounting base for horizontally mounted bracket or bottom position for vertically mounted bracket
- The CT enclosure or switchgear must have adequate space to mount the metering voltage transformer
- Customer shall provide and install the meter base and the metering circuit conduit
- 1-1/4 inch rigid plastic (schedules 40 or 80), or EMT conduit is required between the meter base and instrument transformer enclosure and shall be installed by the customer
- 1-1/4 inch conduit shall be as short as possible, shall not exceed 50 feet in length, and not over 180 degrees in bends. A pull-string is required in any meter conduit over 25 feet.

- Flex conduit shall not be used in meter circuits
- 1-1/4 inch conduit shall not contain LBs or junction boxes

Contact the Central Lincoln meter department at (541) 574-3608 for a list of approved meter bases.

## Table 2: Bases for instrument-rated meters (with CTs)

| Service | Rated Current | Number of Terminals | Socket Type |
|---|---|---|---|
| 1-phase | 201 or greater | 6 | A |
| 3-phase | 201 or greater | 13 Wye or Delta | B |

## Central Lincoln Responsibilities

Central Lincoln is responsible for providing the following:

- Instrument transformers
- Meter and test switch
- Metering circuits (wiring)

## Switchgear Metering

Prior approval is required for all switchgear. Submit panel drawings to the Central Lincoln meter department.

Switchgear is required for services over 800 amps and may be used on services from 201-800 amps at the customer's option with approval.

Three-phase services require a 13-terminal meter base. Outside switchgear may have the meter base attached. Inside switchgear must have the meter base outside; connected with conduit.

No meters may be installed on the switchgear doors.

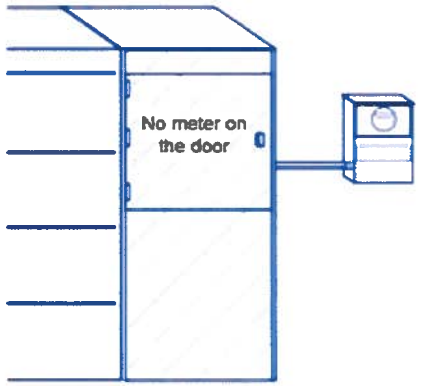
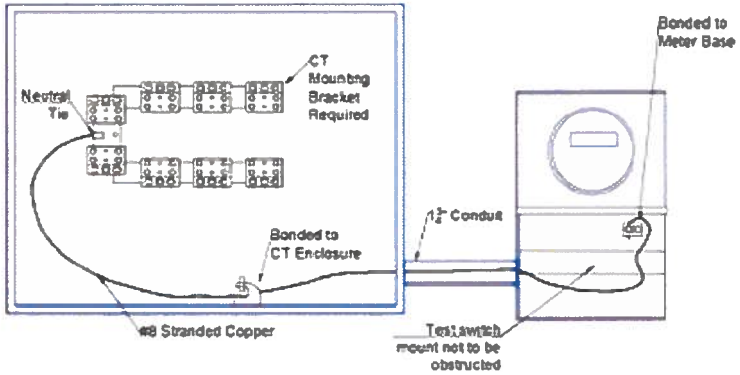



**Figure D-6: Switch gear mounted meter base**



### Figure D-7: Grounding requirements for instrument transformer metering installation