SECTION D

METER REQUIREMENTS

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 (up to 400 Amps - see Table 2, page 17) and three-phase service up to 200 Amps.
- ***Instrument Transformer metering (CT's & PT's)***
  This section contains the requirements for single phase 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. Under emergency conditions, exceptions may be granted to qualified electricians by contacting either the Central Lincoln Meter Department or the service office. When this occurs, the party shall accept all liability for damage or alteration to equipment, injury to persons or property, and loss of revenue to the utility from the time the seal is removed until the equipment is ready to be resealed. The customer or contractor shall promptly notify Central Lincoln when repairs or modifications have been completed. Extreme caution shall be used when meters are removed or installed. Depending upon the type of service or meter base, removal of the meter **may not** de-energize the customer's service.

Do not remove meter without confirmation from our meter department or service office.

EQUIPMENT

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

Central Lincoln will furnish, install (except last item), and maintain the following equipment:

- *Revenue meters.*
- *CT meter wiring.*
- *Test switch.*
- *Instrument (current or voltage) transformers (customer installs).*

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

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

AVAILABLE FAULT CURRENT

It is the customer's responsibility to ensure that any fault current interrupting devices installed meet NEC Article 110 requirements regarding interrupting rating. Central Lincoln can provide information on available fault current at the point of delivery for the original system as installed. However, system changes can cause the available fault current to increase. Current-limiting devices are recommended to ensure that installations continue to meet the intent of NEC Article 110.

METER LOCATION

You are required to install your metering equipment in a place that is accessible to Central Lincoln during normal business hours for meter reading, maintenance, testing, installation and removal. All locations are subject to approval by a Central Lincoln representative. If you have questions regarding meter location, call our nearest service office *(see Page 21)*.

The requirements for properly locating your meter base are:

- *It must be outside your building - not in breezeways or open equipment rooms.*
- *It must be located in an area that is not subject to being fenced or blocked in any way.*
- *It must be located on a structure that is owned by you.*

The reasons for these requirements are:

- *So Central Lincoln's meter readers can read your meter in a safe and cost-effective manner.*
- *So Central Lincoln can efficiently maintain your meter.*
- *If you have a fire, we can disconnect your service.*

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

- *Above the first story level or below the first level of a building. Any exceptions to this rule must have the approval of Central Lincoln's Meter Department before electrical installation begins.*

- *On poles owned by Central Lincoln, or other utilities.*
- *In commercial occupancies they do not serve.*
- *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 shall not be jumpered to provide power.*
- *Any meter base containing energized equipment shall be covered and sealed with a transparent cover plate when a meter is not installed.*
- *All unused openings (knockouts) of the meter base enclosure shall be closed with plugs (rain-tight, if outside) that are locked tightly in place from inside the enclosures, before a meter is installed.*
- *Meters shall be installed only in bases which are level, plumb, and securely fastened to the structure.*
- *Meter bases and enclosures will be acceptable to Central Lincoln if they have been accepted by Underwriters Laboratories (UL).*
- *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 meter equipment exposed to weather shall be rain-tight according to the National Electrical Manufacturer's Association (NEMA) 3R minimum.*

METER CLEARANCES

The center of the meter base 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.

When a meter base enclosure is recessed in the building wall, a flush-type base is required. Building siding shall not cover or overlap the meter base.

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 and related piping shall be at least 36 inches horizontally from the center of the meter base enclosure. *(See Figure D-1.)*

The center of all meter base enclosures 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-2.)*

If a recessed meter base or meter base cover is installed, a clearance of 18 inches is required from the center of the meter to the closest portion of the wall, as shown in Figure D-3.

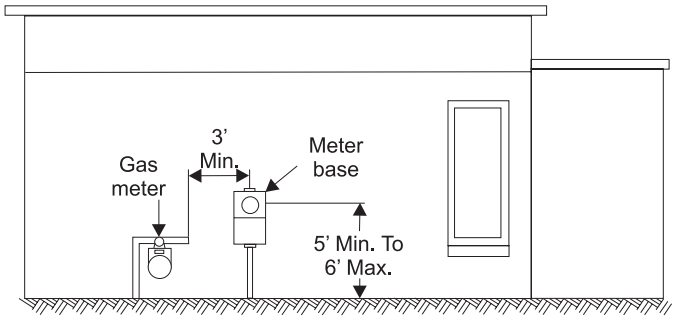


Figure D-1.
Meter base height and gas meter clearances.

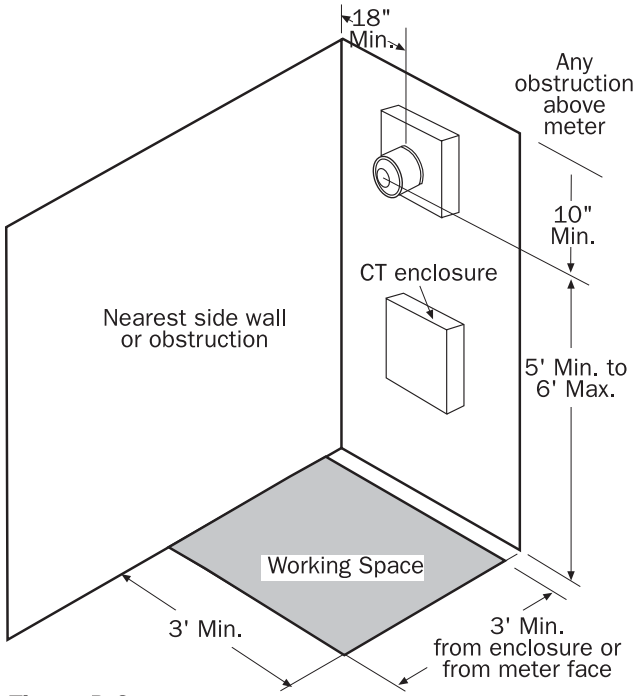


Figure D-2.
Meter base minimum clearance.

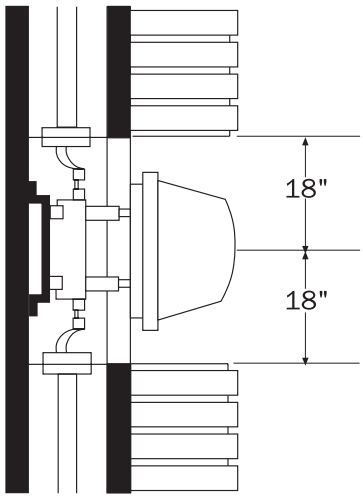


Figure D-3.
Recessed meter base installation showing minimum clearance.

MULTIPLE METER INSTALLATIONS

Multiple meter installations shall comply with the equipment arrangement requirements shown in Figures D-4 and D-5.

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 or adhesive-type labels at least one-inch high and able to withstand severe weather conditions. Felt tip pens and label maker tape are not considered permanent marking. Service will not be established until marking is complete.

FACTORY-BUILT MULTIPLE METER PANEL

Prior to shipment from the factory, the manufacturer shall submit non-residential multiple meter panel drawings to the Central Lincoln Meter Department for approval.

On multi-family residential multiple meter panels, the minimum spacing between base centers *(see Figure D-4)* shall be 8 inches horizontally, 8-1/2 inches vertically, and the base center line will be a minimum of 3 feet and a maximum of 7 feet above the floor or finished grade. On non-residential multiple panels, the minimum spacing between base centers *(see Figure D-5)* shall be 12 inches horizontally, 12 inches vertically, and the meter will be a minimum of 3 feet and a maximum of 6 feet above the floor or finished grade. **Meters shall be adequately protected from mechanical damage, and the installation approved by the Central Lincoln Meter Department.**

SERVICE CONDUCTORS

Meter circuits shall not enter raceways or enclosures containing unmetered circuits, except in specific situations approved by Central Lincoln's meter department.

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.

GROUNDING

All meter bases, enclosures and conduit shall be bonded and grounded in accordance with Articles 230 and 250 of the latest edition of the NEC. When self-contained meter bases are used, the neutral conductor shall be connected to the neutral terminal socket.

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 Central Lincoln's distribution transformers. They may be installed in the customer's service panel, or in a separate enclosure between the 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.

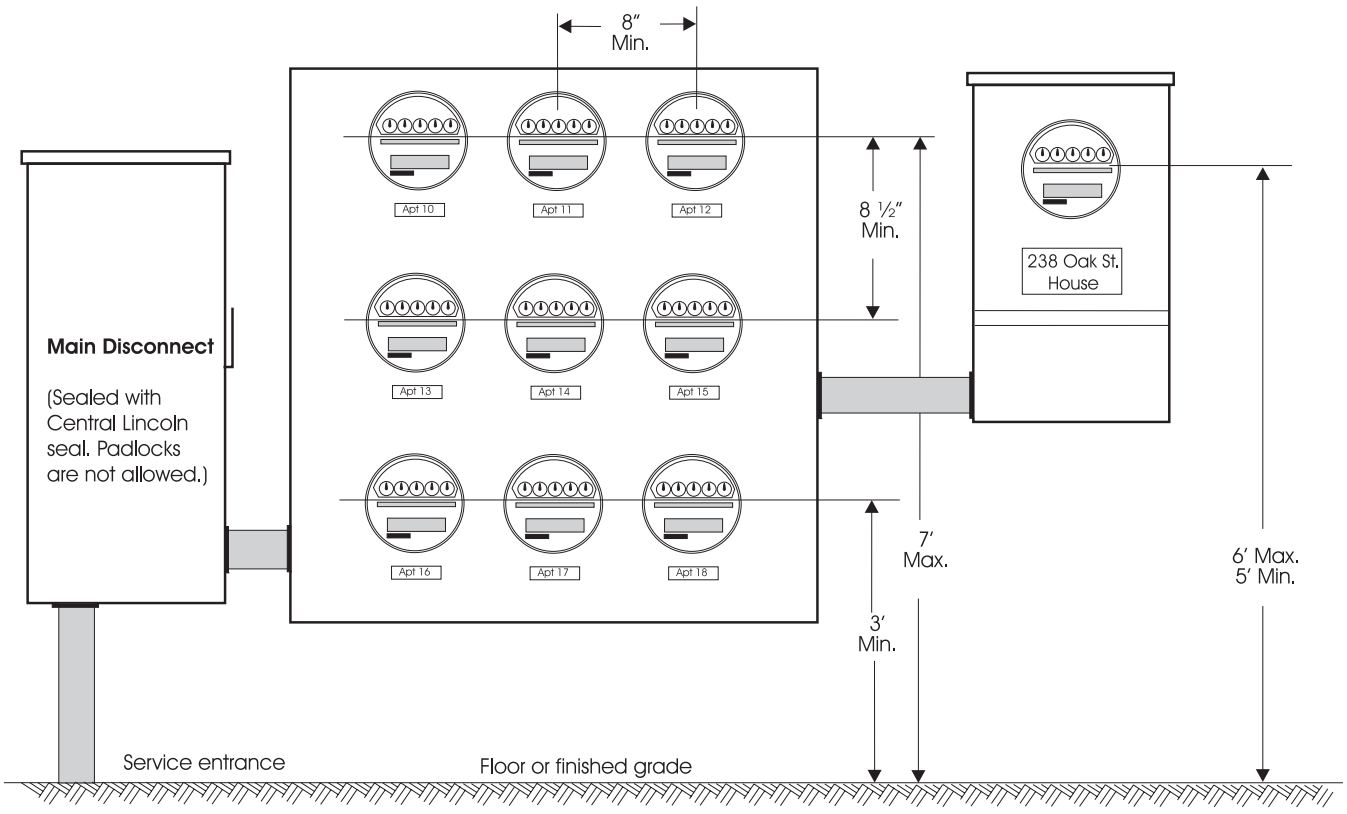


Figure D-4.
Typical factory-built multiple meter assembly for apartment complex.

SELF-CONTAINED METERING

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 in NEC. *(See Fig. D-6-A.)*

UNDERGROUND NON-RESIDENTIAL METER BASES

Underground 1-phase services, 400 amps or less, shall use a self-contained meter base. The recommended enclosure is 4-1/4 inches deep, 11 inches wide, and 14 inches high, minimum.

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: 201 TO 400 AMPS

A self-contained 320 ampere meter base with a 320 class manual bypass *(see Figure D-6-B)* is required on all new and remodeled single-phase services *(120/240 V)* over 200 amps, where the current carrying capacity of the service entrance conductors does not exceed 400 amps, as specified in NEC. Automatic circuit closures are not acceptable as an option. Service conductors shall be arranged in the base to avoid interfering with the meter installation or operation of the manual bypass. Single-phase services with larger than 7½ HP motors must return a completed Load Data Sheet *(see page 22)*.

SINGLE-PHASE 120/208 VOLT SERVICE

A five terminal meter base is required on all single-phase 120/208 volt services *(see Figure D-6-C)*. The fifth terminal shall be in the nine o'clock position, connected to the socket neutral conductor. This meter is referred to as a network meter.

THREE PHASE (0-200 AMPS) 120/240 & 120/208

A seven-terminal meter base is required on all 120/240 delta or 120/208 wye self contained service. The neutral *(grounded conductor)* shall be connected or tapped into the third terminal from the left on the lower terminals *(see Figure D-6-D)*. **No bypasses allowed.**

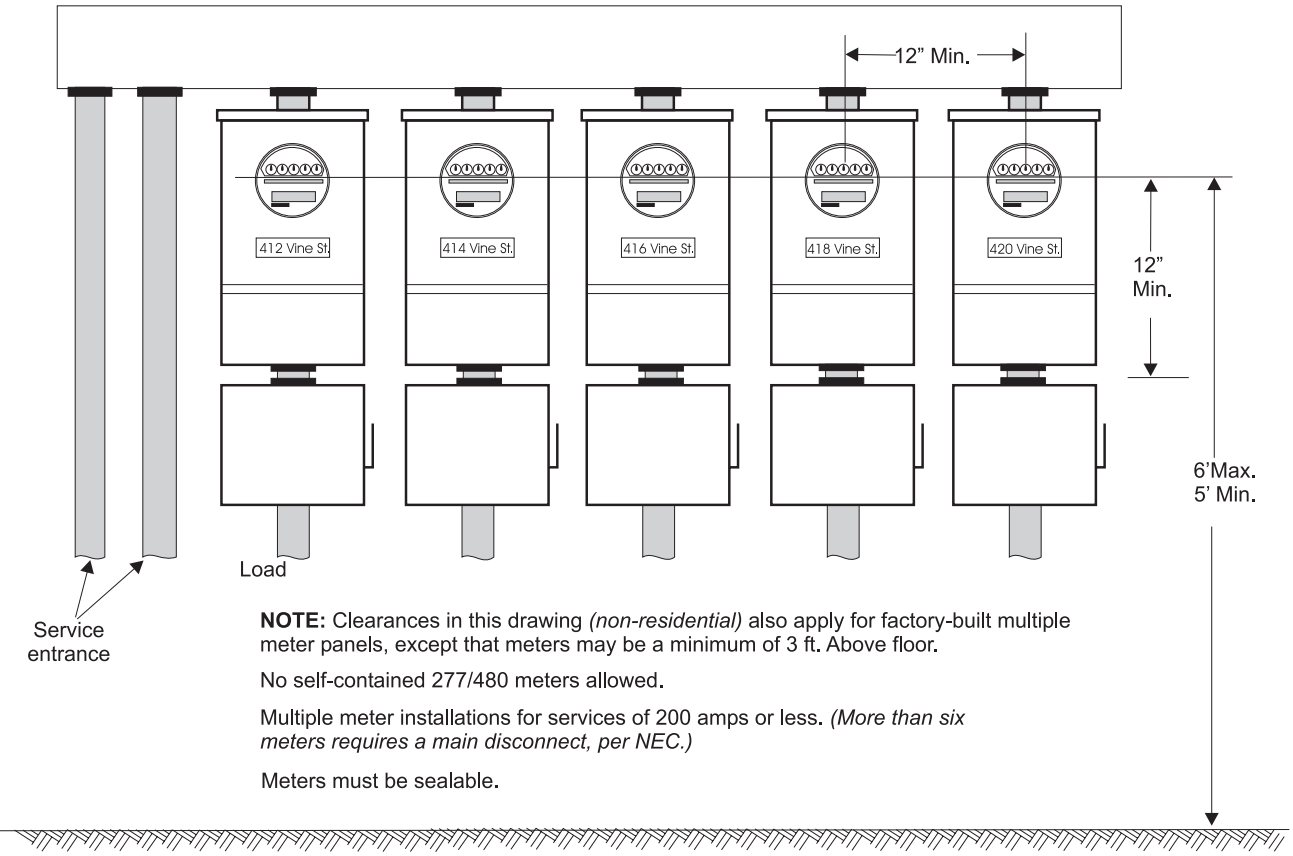


Figure D-5.
Multiple meter installations for office complex.

THREE-PHASE 277-480 V - ALL LOADS

All new 480 volt service installations must be 4-wire 277/480 V. Wye. All 277-480 volt loads shall be metered with instrument transformers. No self-contained meters are allowed. A 13-terminal meter base is required. The CT enclosure or switchboard must have space to mount the three metering voltage transformers.

METER BASE/MAIN DISCONNECT COMBINATIONS

Meter base and circuit breaker combinations are acceptable for 0-400 amps single-phase, and 0-200 amps three-phase, provided the meter base section meets Central Lincoln's manual bypass and dimensional requirements.

Figure D-6 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. Under special conditions permission may be granted to modify this sequence in group installations of less than six individual occupancies, provided all equipment ahead of the meter is sealed by Central Lincoln.

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.

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 as to avoid interfering with the meter installation or operation of the bypass blocks.

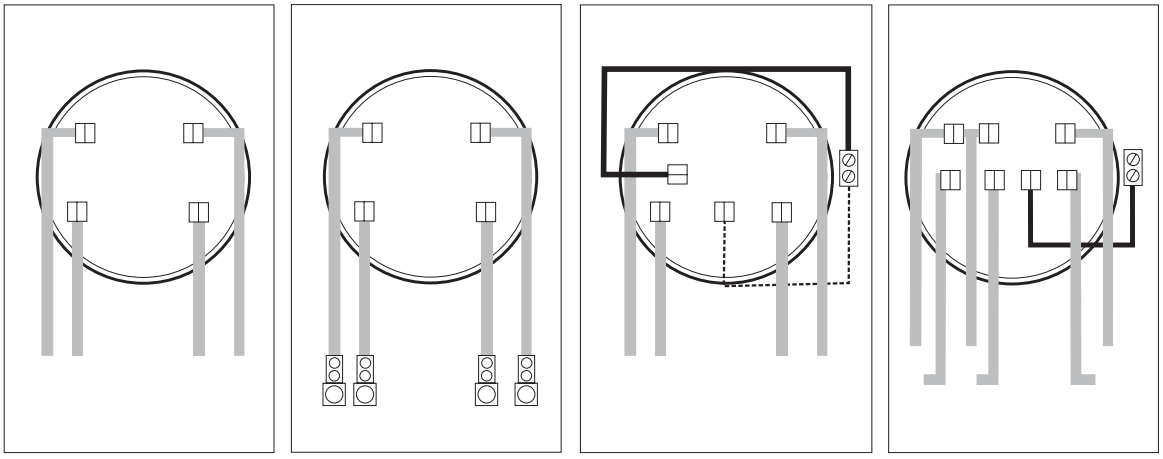
The customer is responsible for ensuring that the connection of service entrance conductors in the meter base shall be inspected and tightened before the service is energized. Where safety sockets are used, circuit connecting nuts will also be properly torqued. Meters shall not be installed unless these 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 under-sized terminals.

INSTRUMENT TRANSFORMER METERING

Provisions for instrument transformers (also known as current and voltage transformers) shall be made when the current-carrying capacity of the service entrance conductors exceeds 400 amps single-phase or 200 amps three-phase, as determined by NEC.

CUSTOMERS RESPONSIBILITY

1. *Provide and install an instrument transformer (CT) enclosure ahead of the main disconnect on the*



A
120/240 V 1-phase
0-200 amps

B
120/240 V 1-phase
201-400 amps
(Manual bypass required)

C
120/208 V 1-phase
0-200 amps

D
120/208 V 3-phase
120/240 V 3-phase *
0-200 amps

* 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 volt, 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 required by NEC *(Section 200-06)*.

Figure D-6.
Self-contained meter bases.

outside of the structure, or in an approved electrical room. The customer shall install the CT enclosure on the supply side of the main disconnect, unless otherwise approved by Central Lincoln's meter department.

- All CT enclosures require a minimum front clearance of 36 inches. Hinged CT doors shall not block a safety exit while open.
- The top of the CT enclosures shall be a maximum of 8 feet above the floor or finished grade: the bottom shall be a minimum of 6 inches above the floor/grade. Enclosures shall not be mounted in crawl spaces, attics, any confined areas, or mounted to ceilings.

Table 1: CT Enclosure Minimum Dimensions.

Service	Switch Ampacity	Number of CT's	Enclosure Ht.	Width	Depth
1 Phase	400-800	2	24"	24"	11"
3 Phase	200-400	3	36"	36"	11"
3 Phase	401-800	3	36"	36"	11"
3 Phase*	over 800	3		*	

** Services over 800 amps require a switchboard designed to Central Lincoln specifications. Refer to the switchboard metering section on page 18 for more information. Services from 201-800 amps may be switchboard designed.*

Note: An instrument transformer enclosure shall contain only the main service conductors. A maximum of four main service conductors may be served off the load side of each instrument transformer mounting bracket. Call the meter department if additional conductors are needed. Splicing of service conductors is not allowed in CT enclosure.

2. *Contact the meter department for a list of approved meter bases. Provide and install the meter base (see Table 1 and Figure D-7) and the metering circuit conduit.*

- 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. Conduit shall be as short as possible, and shall not exceed 50 feet in length, and not over 180 degrees in bends, unless specifically approved by Central Lincoln's meter department. A pullstring is required in any meter conduit over 25 feet. Flex conduit shall not be used in meter circuits. Conduit shall not contain condulets or junction boxes and shall be sized as follows:
- Single-phase = 1 inch.
- Three-phase = 1-1/4 inch minimum.

3. *Transport Central Lincoln provided instrument transformers from meter department to project site. Installation of instrument transformers is the customers responsibility.*

CENTRAL LINCOLN RESPONSIBILITIES

Central Lincoln is responsible for providing the following:

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

Note: Customer is responsible for installing instrument transformers.

Table 2. Bases for instrument-rated meters (with CT's)

Service	Rated Current	Number of Terminals	Socket Type *(See Fig. D-7)*
1-Phase	401 or greater	6	A
3-Phase	201 or greater	13 Wye or Delta	B
3-Phase*	201 or greater	8 Delta	C

** Not available for new construction. All new 480 volt service installations must be 4-wire 277/480 V. Wye.*

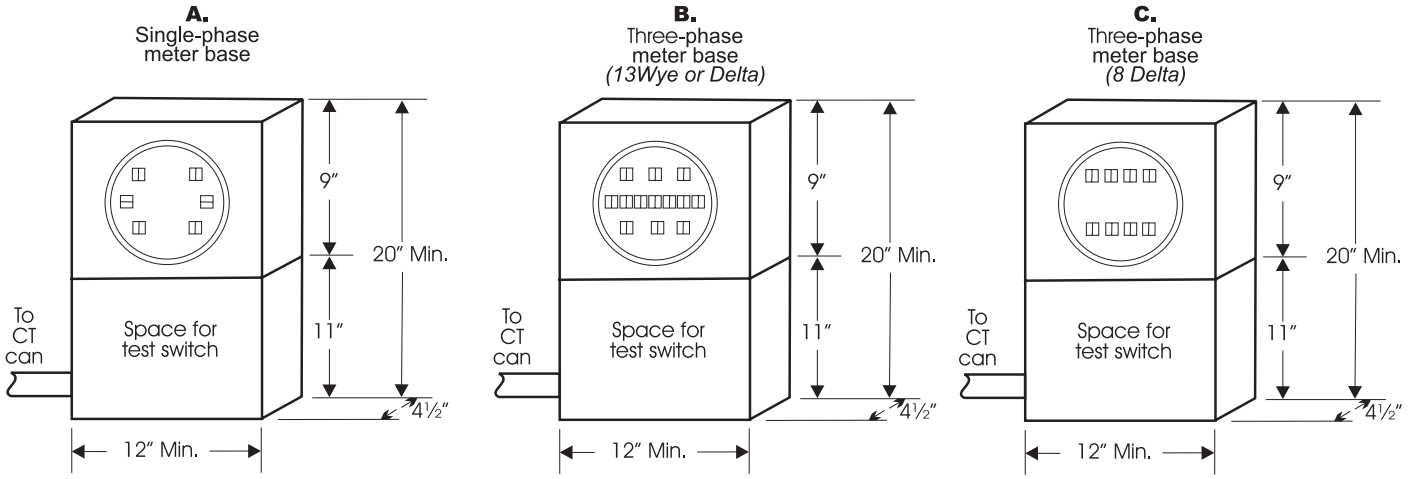


Figure D-7.
Bases for instrument-rated meters.

SWITCHBOARD METERING

A switchboard is required for services over 800 amps. Switchboard metering may be used on services from 201-800 amps at the customer's option. *(See Figure D-8.)*

Three-phase services require a 13-terminal meter base. Outside switchboard may have the meter base as part of the unit (tests switch required), or have the meter base attached. Inside switchboard must have the meter base outside and connected with conduit.

One set of drawings shall be submitted for approval on all switchboard metering prior to shipment from the manufacturer. Send the drawings directly to the Central Lincoln meter foreman.

GROUNDING

All meter bases, enclosures and conduit shall be bonded and grounded in accordance with Articles 230 and 250 of the latest edition of the NEC. *(See Figure D-9.)*

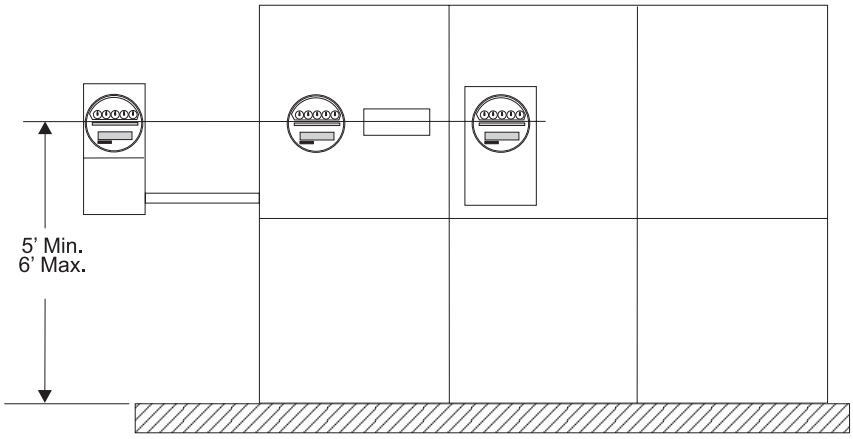


Figure D-8.
Switchboard-mounted meters.

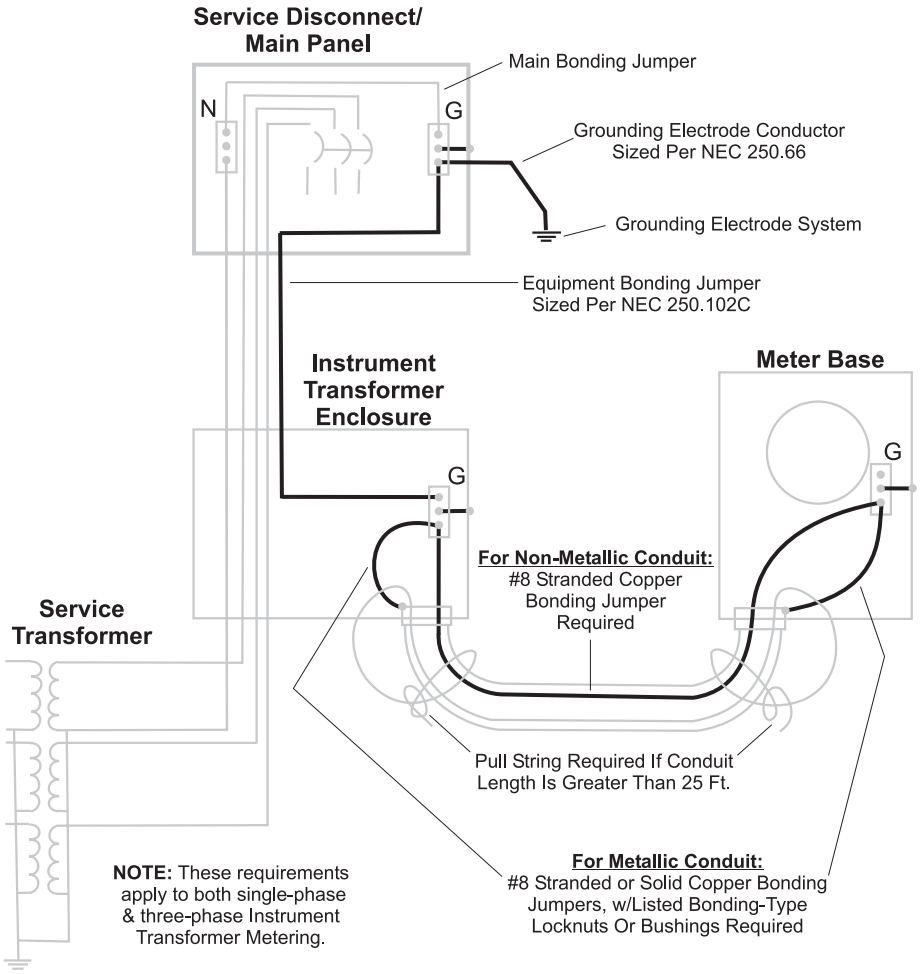


Fig. D-9. Grounding requirements for instrument transformer metering installation.