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**1. METERING**

**1.1. GENERAL**

Unitil will furnish, own, test and maintain all meters required for billing purposes in accordance with applicable tariffs and regulations.

Meters will be installed, removed, and changed only by authorized Unitil employees or a Unitil approved contractor.

Unitil may refuse to connect a service or install a meter on any metering installation that does not conform to Unitil "Requirements for Electric Service Connections".

Meter sockets up to 400 amps will be provided by Customer.

Meter sockets for transformer rated metering will be provided by Unitil.

**1.1.1. REMOVING AND INSTALLING METERS**

Only qualified personnel, authorized by Unitil, are permitted to cut seals, and remove or install meters. Under emergency conditions, exceptions may be granted to qualified electricians by contacting Unitil metering department. When this occurs, the party accepts all liability for damage or alteration to equipment, injury to persons or property, and loss of revenue to Unitil from the time the seal is removed until 72 hours after Unitil has been notified that the equipment is ready to be resealed. The Customer or electrical contractor must promptly notify Unitil when repairs or modifications have been completed. Extreme caution must be used when meters are removed or installed. Depending upon the type of service or meter base, removal of the meter might not de-energize the service.

**1.1.2. METER LOCATION**

The Customer must install the meter socket where it will be accessible to Unitil personnel. Meter socket locations require prior approval by a representative of Unitil. The Customer must provide a safe, accessible location for metering equipment. The meter location must be free from obstruction, corrosive atmosphere, abnormal temperature, vibration. All meters, meter equipment, and enclosures must be readily accessible by Unitil personnel during normal business hours for meter reading, maintenance, testing, installation, or removal. Customers must provide keys for any meter that is inaccessible because it is behind a locked door.

**1.1.2.1. Acceptable locations for meter socket:**

- Located outside, except for a pre-approved electrical room
- Located on the front one-third of the house closest to normal public access and/or Unitil service point
- Located on the driveway gable side
- Located in an area that is not subject to being fenced
- Located on a structure that is owned by the Customer

#### 1.1.2.2. **Unacceptable locations for meter socket:**

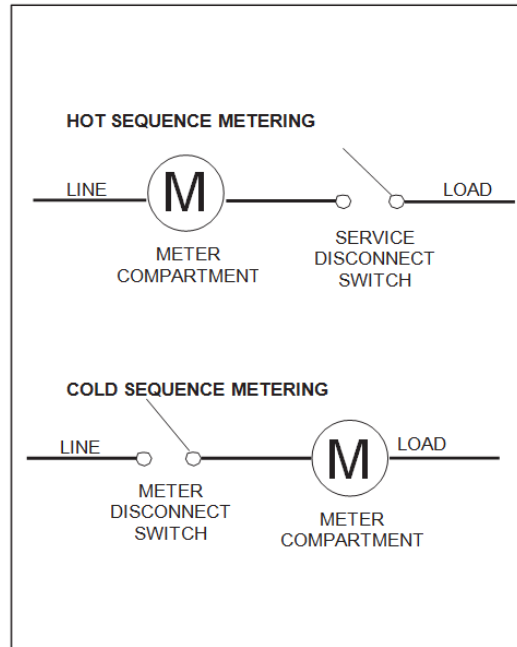
- Above the first story level or below the first basement level of a building. Any exceptions to this rule must have the approval of Unitil Meter Department before the electrical installation begins
- On any line pole occupied solely by the telephone company, except to serve telephone company equipment
- In commercial occupancies they do not serve (i.e. Adjacent units)
- Any place where safety may be compromised
- Located under an eave with less than a 12 inch overhang, meter will require a shelter over it to prevent ice damage
- On pad mount transformers, unless prior approval is granted by the Unitil Meter Department
- In an area where the grade under the meter is uneven or pitched so as to create an unsafe working condition.

#### **The reasons for these requirements are:**

- If there is a fire or other disaster, Unitil can disconnect the service by removing the meter
- So Unitil can read the meters in a safe, cost-effective manner
- So Unitil can efficiently test and maintain the meter

#### 1.1.3. **METER SOCKET REQUIREMENTS**

- Require Unitil approval
- Be rated for exterior use and be rain tight according to NEMA-3R
- Be UL (Underwriters Laboratory) approved for application
- Terminals must be clearly marked with a Manufacturer's listing and labeling for the intended use
- Unused openings must be tightly sealed from the inside of the socket
- Meter sockets must be plumb and securely fastened to the supporting structure
- Meter sockets may be ring or ring-less type
- Meter sockets shall not be altered or bypassed to provide power
- Any meter socket containing energized equipment must be covered and sealed with a transparent cover plate when a meter is not installed
- Residential services rated at 400 amps require a meter socket with lever by-pass and an external disconnect or an integral main breaker
- Commercial services rated at 400 amps or less, require a meter socket with a lever by-pass and an external disconnect or an integral main breaker
- Three-phase services rated at 400 amps or less, require a meter socket with a lever by-pass and a disconnect or an integral main breaker
- Services metered at greater than 400 amps must be transformer rated.
- 277/480 volt services that are rated greater than 200 amps must be transformer rated.
- Unitil will specify the metering transformers, meter socket with test switch, and control cable wire for transformer rated services
- Sequence of meter and disconnect –
  - Hot Sequence – Disconnect after the meter
  - Cold Sequence – Disconnect before the meter



#### 1.1.4. FACTORY BUILT MULTIPLE METER PANEL

- Prior to shipment from the factory, the manufacturer must submit commercial multiple meter panel drawings to the Unitil Meter Department for approval
- The meter socket drawing needs to be verified for meeting height requirements and correct meter form terminals

#### 1.1.5. SERVICE CONDUCTORS

- Metered circuits must not enter raceways or enclosures containing unmetered circuits, except for meter loops on poles or in specific situations approved by Unitil Meter Department

#### 1.1.6. CUSTOMER LOAD MONITORING

- The Customer's load monitoring equipment must be installed only on the load side of the meter. Customer load monitoring equipment is not allowed inside a meter or current transformer enclosure

#### 1.1.7. CLEARANCE REQUIREMENTS

The Customer must provide and maintain the following clearances around all meter installations:

- The center of the meter must be between 5 and 5 ½ feet above finished grade
- Vertically stacked meter base installations shall not be located such that the top meter is more than 6 feet, nor the bottom meter is less than 3 feet above the ground or final grade.
- A working space of 3 feet wide by 3 feet deep is required around the meter. This working space is to be kept clear of any obstructions including landscaping
- Must meet the National Electrical Code clearance requirements

### 1.1.8. ELECTRICAL ROOMS

- Meter sockets may be located inside an electrical equipment room
- The electrical room must be used solely for power and communication equipment
- The electrical room must be well lit, accessible during normal business hours, and not used for storage
- The Customer is responsible for providing a location near the door for installation of a key lock box, and the key for the lock box
- A sign on the exterior door saying “Electrical Room”

### 1.1.9. GROUNDING

All meter sockets, enclosures, and conduits must be bonded and grounded in accordance with the current edition of the NEC. A suitable means must be provided by the Customer for attachment of other utilities to the Customer’s grounding electrode system.

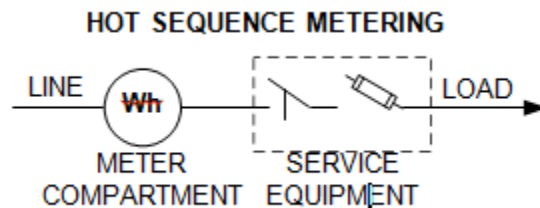
## 1.2. SERVICES 400 AMPS OR LESS

### 1.2.1. SERVICE CONDUCTORS FOR SELF-CONTAINED METERING

Line-side conductors must always be connected to the top terminals of the meter socket. Service conductors must be arranged in the socket to avoid interfering with the meter installation or operation of the bypass. The Customer is responsible for ensuring that the connection of service entrance conductors in the meter socket are inspected and properly torqued before the service is energized. Meters will not be installed if conductors place undue strain on the terminal facilities. Terminals must be rated for the size of the conductor to be used. Strands must not be removed or reconfigured to make conductors fit under-sized terminals.

### 1.2.2. SEQUENCE OF EQUIPMENT

All self-contained service equipment must 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 Unitil.



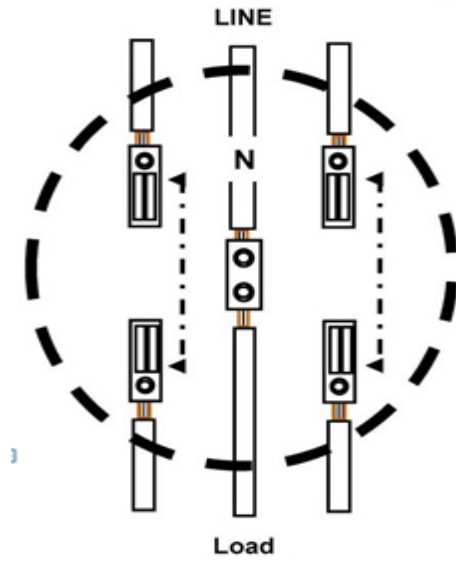
### 1.2.3. BASIC SINGLE-PHASE SERVICE

The 120/240 volt, 200 ampere service is the most common service and is typically installed on homes and small businesses. However, it is the Customer’s responsibility to determine electrical requirements and to notify Unitil of the service size needed.

Single-phase, 3-wire

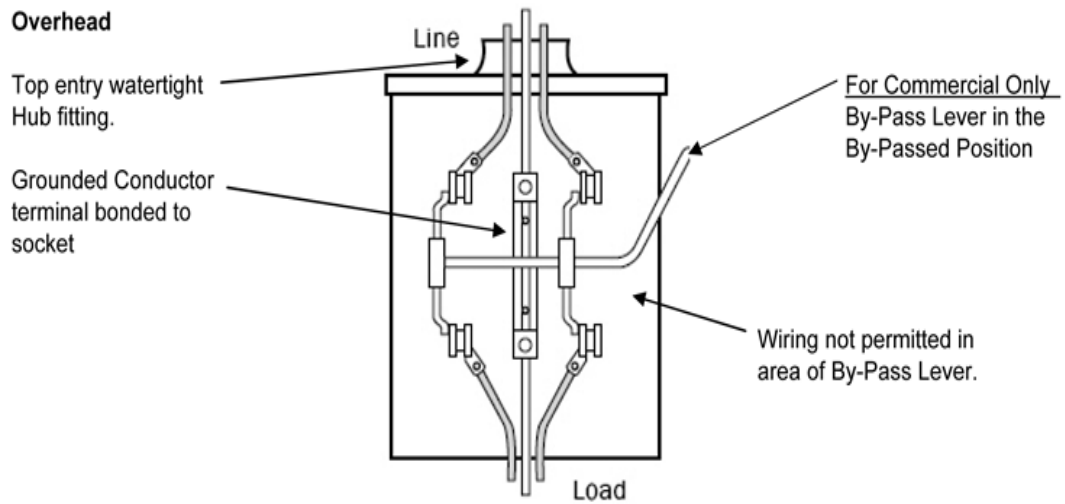
4 Terminal Meter Socket

120/240V



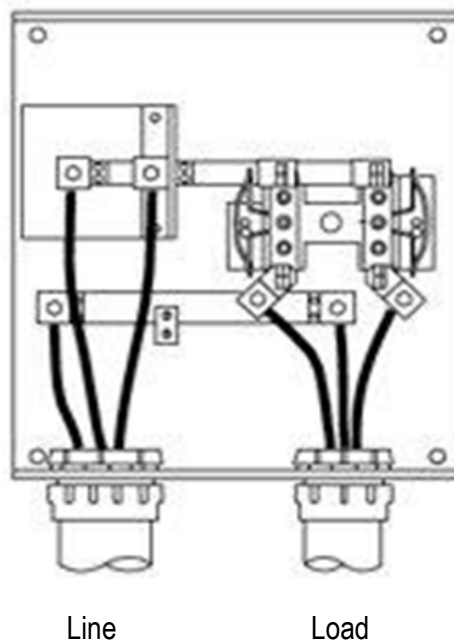
4 Terminal Meter Socket – Overhead

Meter Form 2S



4 Terminal Meter Socket – Underground

Meter Form 2S



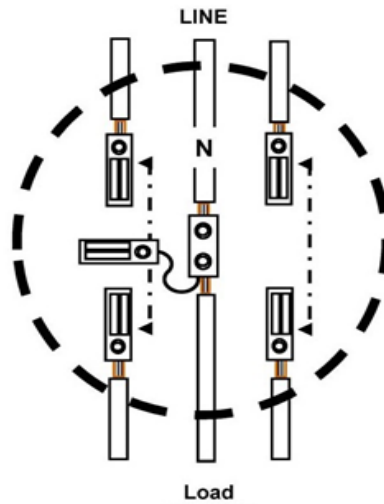
### 1.2.4. SINGLE-PHASE 120/208Y VOLT SERVICES (Network Metering)

A five-terminal meter socket is required on all single-phase networked 120/208 volt service. The fifth terminal must be in the nine o'clock position, connected to the meter socket neutral bus conductor.

Single-phase, 3-wire

5 Terminal Meter Socket

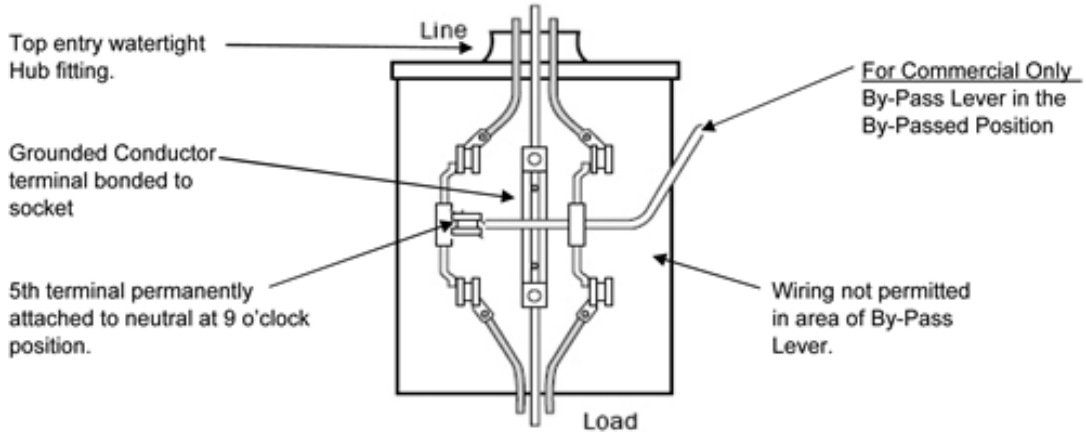
120/208V



5 Terminal Meter Socket – Overhead

Meter Form 12S

#### Overhead



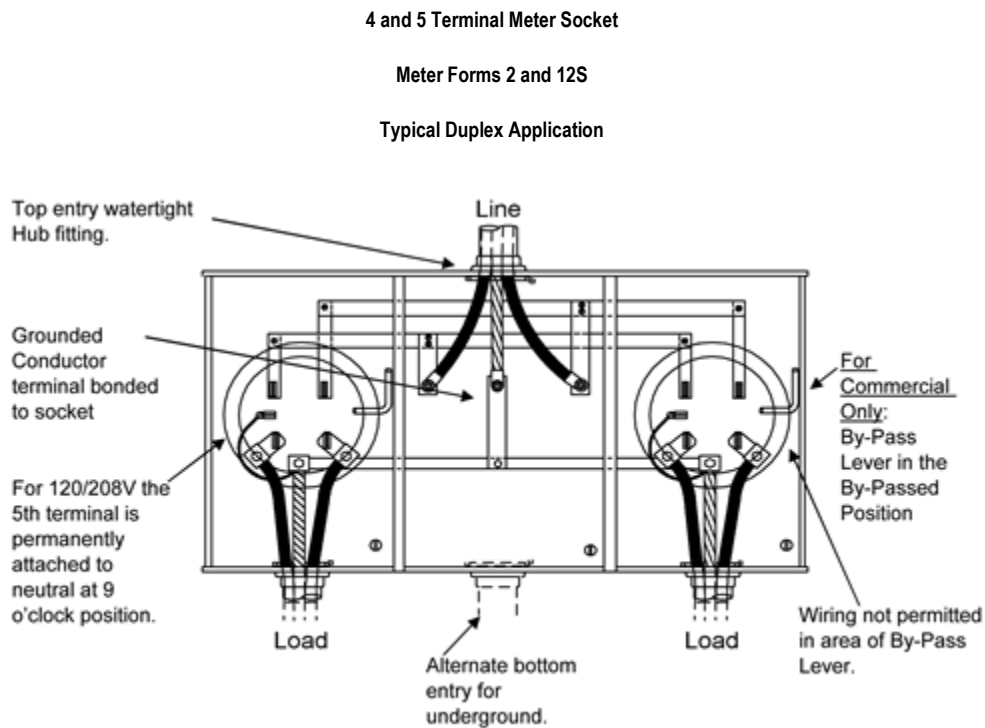


## 1.2.5. MULTIPLE SINGLE PHASE METER SOCKET APPLICATIONS

### 1.2.5.1. LABELING

- Multiple meter sockets shall be permanently labeled to indicate the section or unit they serve; the customer's or business name is not acceptable.
- Accepted label names are the 911 address, unit number of a condo or apartment. The meter socket label must identically match the unit number the meter will be supplying power to.
- The labels must be engraved identifying plates, fade-resistant, and at least one inch high.
- Felt-tip pens, paint pens and label maker tape are not considered permanent markings.
- Electric service will not be established until the marking of each multiple meter socket is complete and verified for accuracy.
- The meter department will verify the unit numbers on the meter socket, physical unit number or access door and that the meter installed powers the correct unit as labeled on the meter socket.

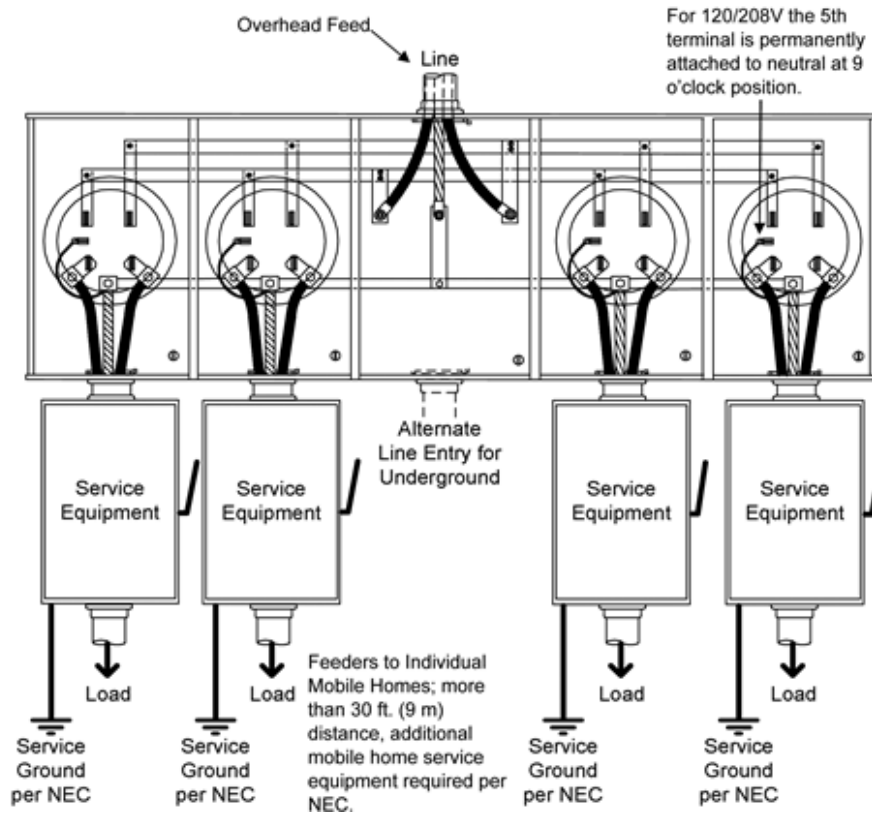
### 1.2.5.2. MULTIPLE METER SOCKET EXAMPLES



4 and 5 Terminal Meter Socket

Meter Forms 2 and 12S

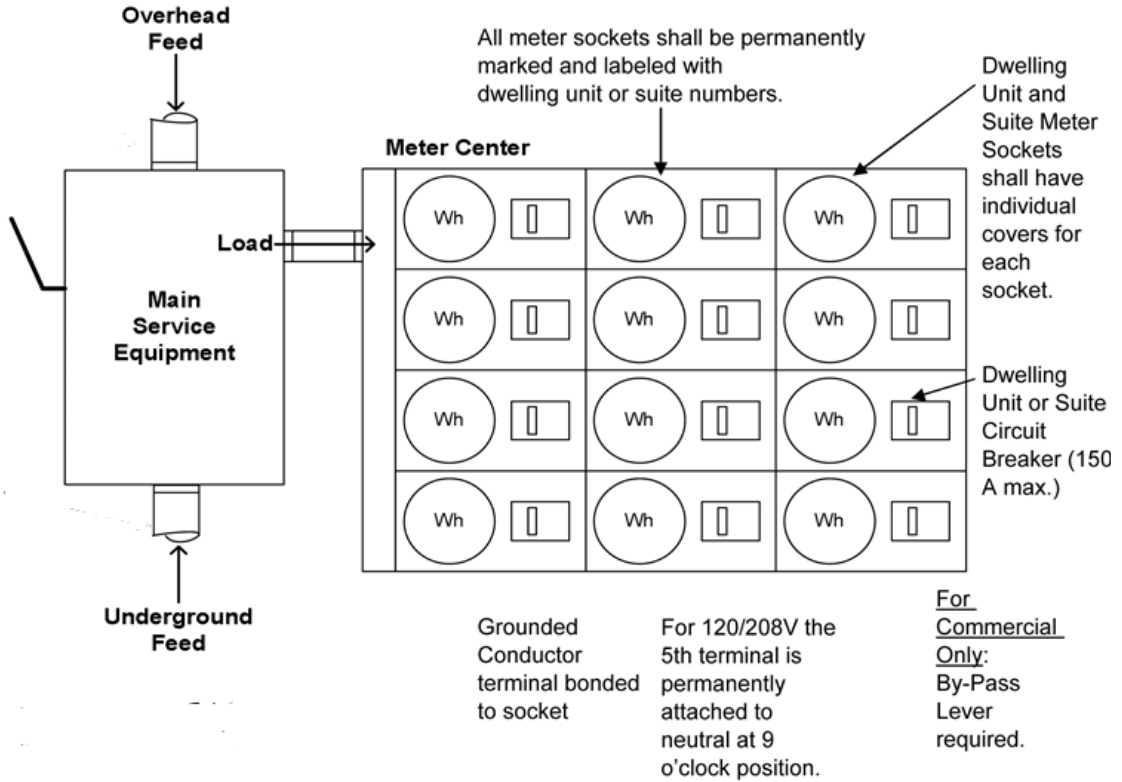
Typical Mobile Home and Recreational Vehicle Park Application



4 and 5 Terminal Meter Socket

Meter Forms 2 and 12S

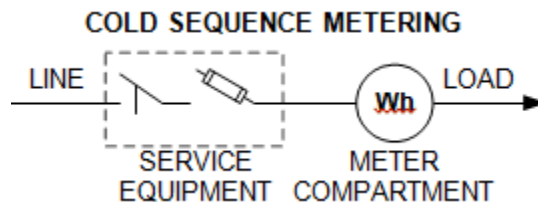
Typical Residential or Commercial Meter Application for More Than 6 Meters



**1.2.6. THREE PHASE 120/208Y VOLT SERVICES or 200 AMP - 277/480Y VOLT SERVICES**

Three-phase service requires a seven-terminal meter socket; the neutral (grounded) conductor must be connected to the third terminal from the left on the lower terminals.

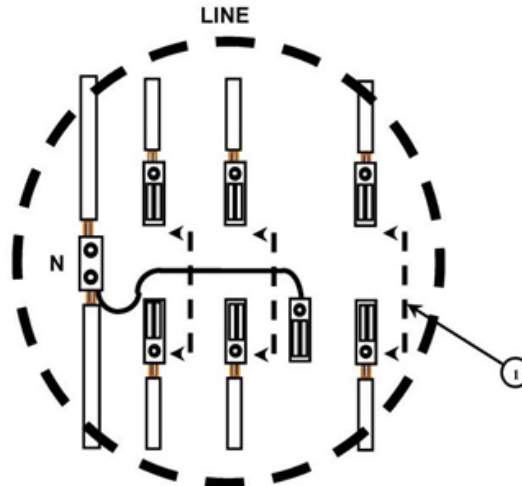
All 277/480Y three phase services shall have a main switch mounted on the line side of the meter socket (cold sequence) so that the meter can be removed “de-energized” from the meter socket.



7 Terminal Meter Socket

Meter Forms 16S

Typical Three Phase Meter Socket Connections 120/208V and 200 Amp 277/480V

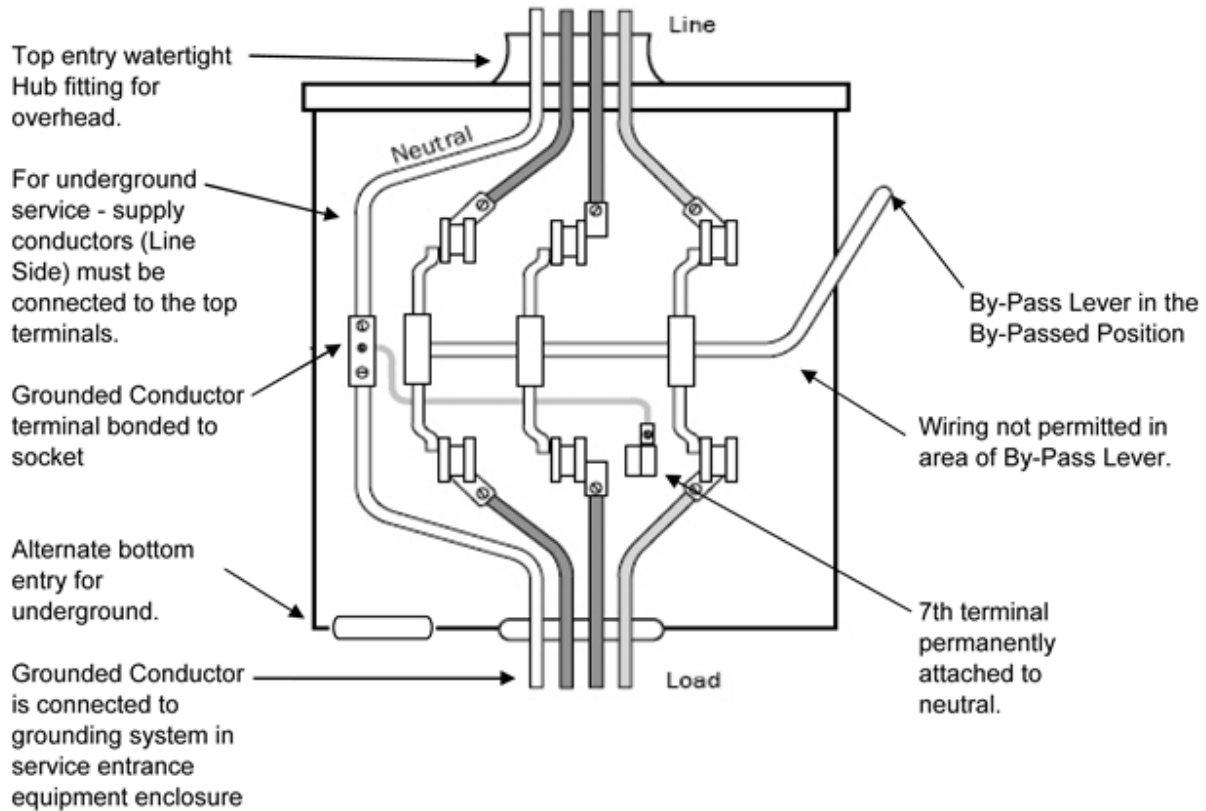


Load  
208Y/120v  
or  
480Y/277v  
Three-phase, 4-wire  
7 terminal meter socket  
400 amp or less

Note 1 - An approved lever operated manual bypass with jaw release and flash shield

7 Terminal Meter Socket

Meter Forms 16S



Service conductors shall be installed in a complete cable-in-conduit system according to the NEC.

All 480 Volt class self-contained meters shall be cold sequenced.

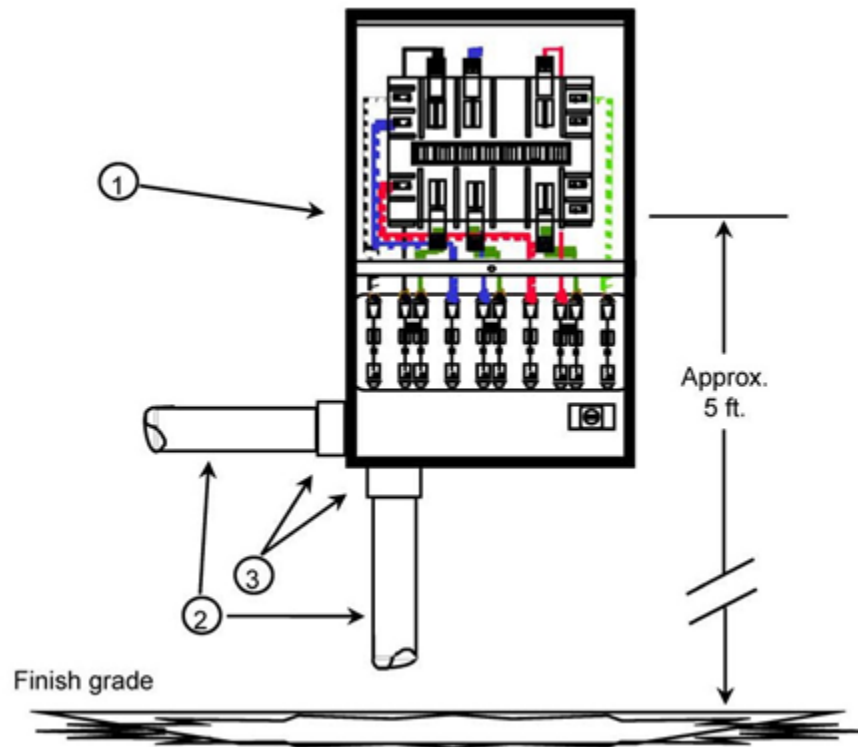
**1.3. SERVICES GREATER THAN 400 AMPS (Single Phase and Three Phase)**

Provisions for current transformers must be made when the current-carrying capacity of the service entrance conductors exceed 400 amps single phase or three phase, as determined by NEC.

13 Terminal Meter Socket

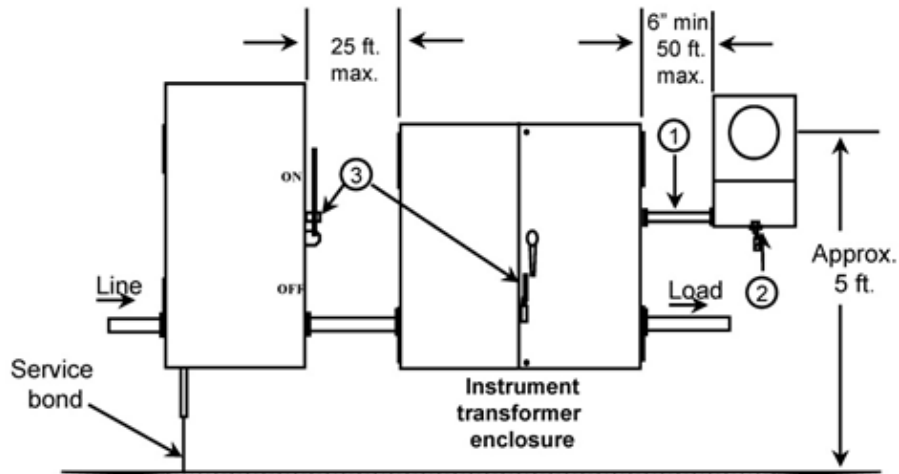
Meter Forms 9S

Typical Three Phase Meter Socket Connections 120/208V



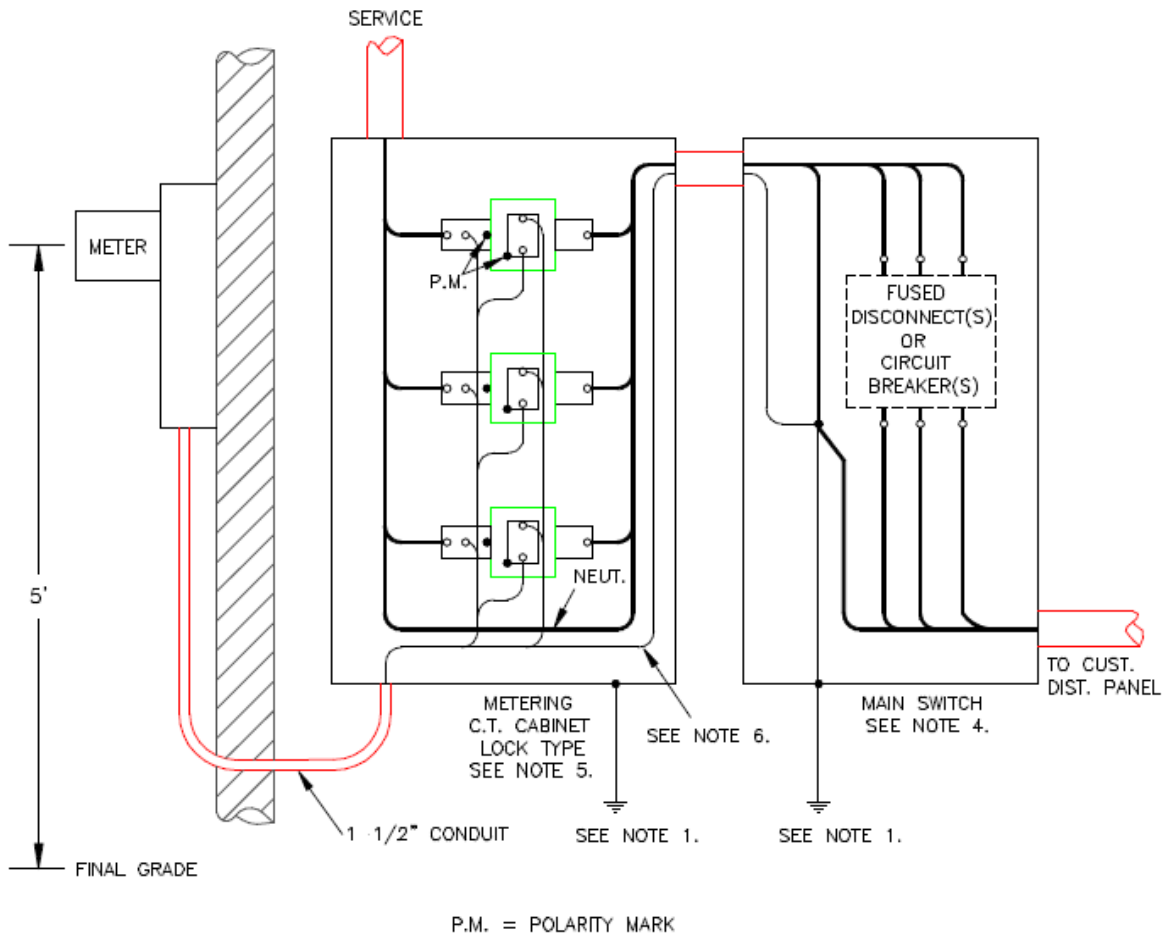
1. Approved pre-wired meter socket with test switch supplied by company
2. Minimum 1 ½ " electrical grade, schedule 40 PVC or galvanized steel conduit to be a minimum of 6 inches, maximum 25 ft. Conduit is to be installed in the bottom or side of the meter socket only. Top feed not allowed.
3. Weatherproof joint.

Typical Transformer Rated Design for Cold Sequence



1. Minimum 1 ½ " electrical grade, schedule 40 PVC or galvanized steel conduit to be a minimum of 6 inches but long enough to prevent cabinet door from hitting meter when the door is opened, maximum 25 ft. Top feed not allowed.
2. Approved pre-wired meter socket with test switch supplied by company
3. Must have locking devices for main disconnect and instrument transformer enclosure.

Typical Transformer Rated Design for Hot Sequence



Notes:

1. All electrical equipment and enclosures shall be grounded and bonded as per National Electric Code.
2. Unitil will supply the meter base, current transformers, and wiring to meter, #12 minimum.
3. Wiring for metering potential will be tapped from CT primary bus bars on the utility source side.
4. Main switches, fused or circuit breakers as required by National Electric Code.
5. 36" X 36" X 10" CT cabinet, sealable, pad lock type. If cabinet is to be located outdoors, it must conform to NEMA 3R or NEMA 4X if within 1/2 mile of coastal waters
6. Customer to provide secondary neutral conductors (#6) in CT cabinet for meter wiring.
7. Meter socket installed outside or at a company approved location and mounted 5' finished grade to the center of the meter.
8. Clearance of 3 ft. to be provided around meter socket.



**The Customer is responsible for the following:**

- Wiring, connectors, and lugs (except meter control cable wiring)
- Supplying and installing disconnect switches
- Supplying and installing conduits
- Installing transformer rated meter sockets which are supplied by Unitil
- Supplying a load data survey sheet to the Company for metering equipment sizing and requirements
- Providing and installing a current transformer (CT) enclosure where designated by Unitil. The Customer must install the CT enclosure on the supply side of the main disconnect for “hot sequence” and the load side of the main disconnect for “cold sequence” applications.
- All CT enclosures require a minimum front clearance of 36 inches. Hinged CT enclosure doors must not block a safe exit while open. Meter socket must be mounted outside of the swing of the doors so as not to hit the meter when doors are opened.
- The top of the CT enclosure is a maximum of 6 feet above finished grade; the bottom is a minimum of 3 feet above the finished grade
- All CT enclosures shall be located on the exterior of the building, unless approved by the Unitil meter department
- All Customer-supplied CT mounting equipment shall be listed and labeled, and shall be installed and used in accordance with any instructions included with that equipment
- CT cabinet shall be mounted within 25 feet of the company supplied meter socket
- CT cabinet and meter socket shall be mounted on a building wall or Unitil approved pedestal

**1.3.1. SERVICE EQUIPMENT**

The Customer is responsible for furnishing, installing, and maintaining all required service entrance equipment including the service conductors to the point of delivery designated by Unitil. For services where current transformers (CTs) are required, the Customer’s electrician must also run a 1 ½” conduit from the CT enclosure to the meter base. Unitil supplies the CT/VT’s and metering control cable. A pull-string of ¼ inch polypropylene rope is required in all meter conduits over 5 feet in length.

**1.3.2. EQUIPMENT SECURITY REQUIREMENTS**

Current transformer (CT) enclosures, switch gear, gutters that contain unmetered conductors, and metering equipment must have provisions for Unitil locks and Unitil sealing. Customers can contact Unitil Meter Department to obtain access for inspection.

**Unitil will furnish, install and maintain the following equipment:**

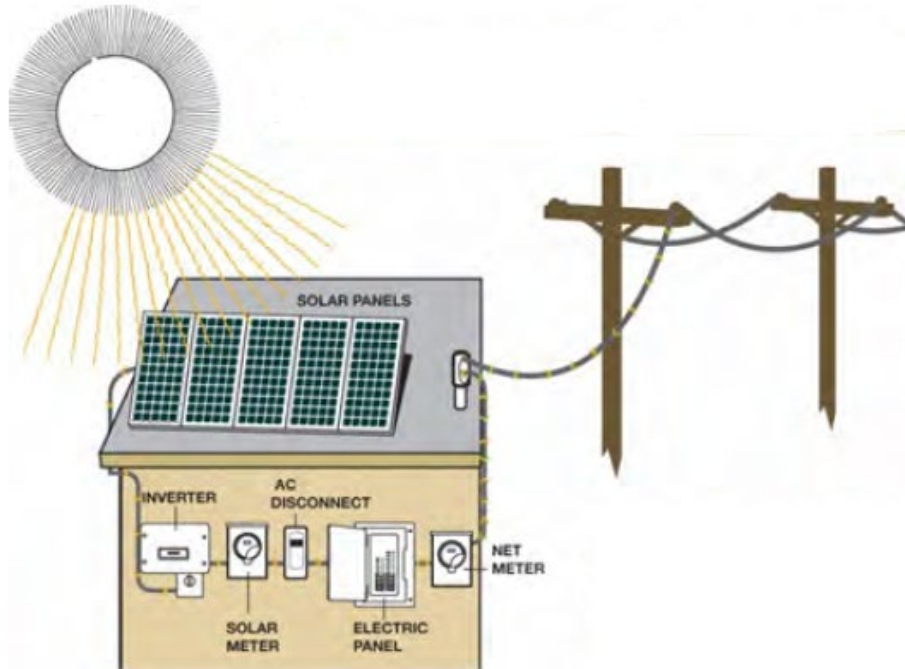
- Revenue Meters
- Current Transformers
- Meter Control Cable
- Transformer Rated Meter Socket

## 1.4. NET METERING

A NET meter is a specifically programmed, bi-directional meter that measures electricity flow at the customer meter socket in two directions. It measures the amount of electricity “delivered” to the customer from the utility. It also measures any “received” electricity which occurs when a customer’s generator produces more electricity than a customer can use at any given time. The excess that is sent back to the utility is the electricity “received”. The NET kWh reading is calculated by subtracting the amount received from the amount delivered (Del – Rec = Net).

During the billing cycle, it is common to have the meters delivered and received register readings increment differently every day based on customer loading demands and generator production. However, at the date of the billing cycle Unitil bills the NET kWh reading for billing. This amount of bill or refund is dependent on the difference between the NET readings on the bill cycle date as compared to the previous bill date.

This meter will be labeled and identified as a Net Meter by a sticker on the meter or on the meter socket.



### 1.4.1. PRODUCTION METER REQUIREMENTS

A production meter is a Unitil meter which is installed on the load side of the customer’s generator and before the customer’s main breaker panel. The Unitil production meter measures the total generator output (delivered from the generator) before any electricity is consumed by the customer. This production meter isn’t the same measurement as the NET meter described above.

For services that require a production meter, a Unitil production meter will be installed to measure the total generator output. Typical installations are a meter socket for the production meter which will be located on the load side of the generator’s inverter. A disconnect switch is required between the production meter and the customer’s load panel.



Meter equipment requirements will be determined by service load and voltage as previously described in this document.

This meter will be labeled and identified as a “Solar Meter” or “Production Meter” by a sticker on the meter or on the meter socket.

A meter cable of being read via telemetering may be required in the event the Production Meter isn’t able to communicate with the Company’s AMI system.

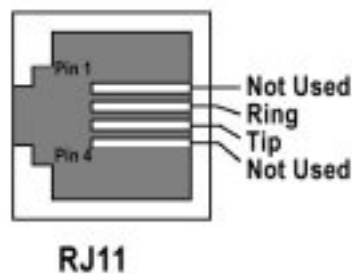
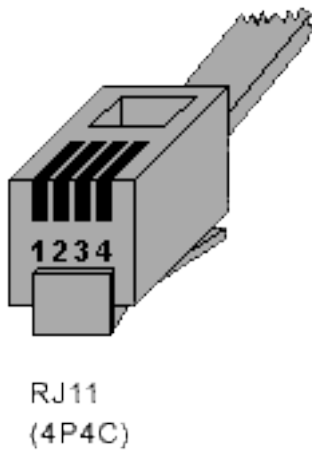
#### **1.4.2. CUSTOMER GENERATORS >60kW in MA or > 100kW in NH**

Meters associated with customer generators that are larger than 60kW in MA or 100kW in NH are required to be telemetered so that readings can be obtained on a daily basis. This applies to both the utility interconnection meter and the production meter.

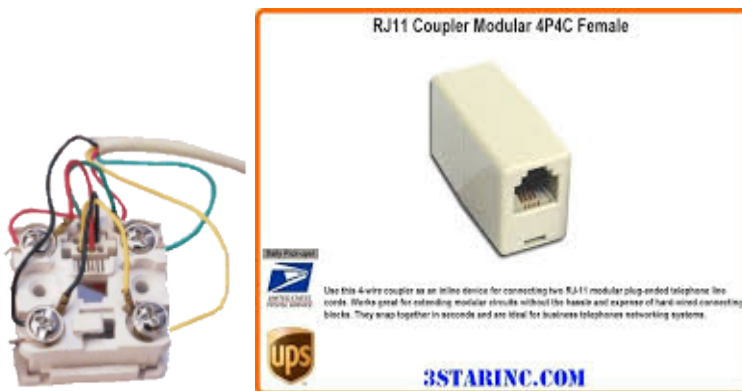
#### **1.5. PHONE LINE REQUIREMENTS FOR TELEMETERING OF ELECTRIC METERING**

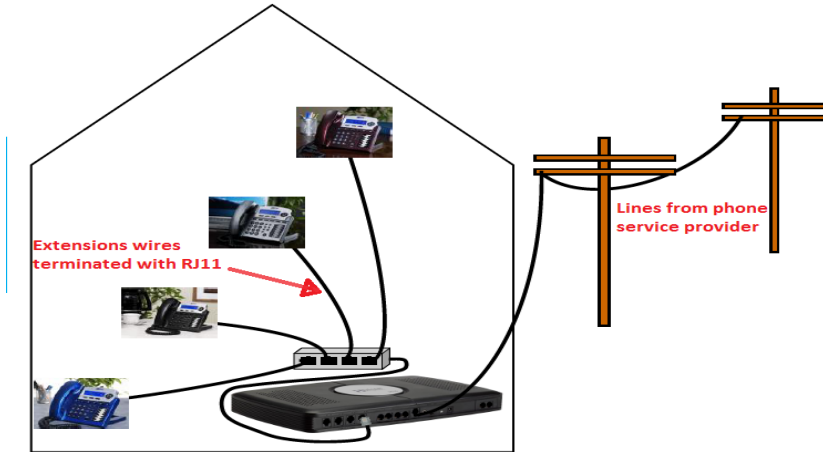
- **ANALOG** phone lines provided by telephone companies are preferred, yet residential type Comcast routers will be accepted as long as they can be configured to operate as a “pots” line. (Plain Old Telephone Service)
- The phone line will be tone capable with an active dial tone when Unitil installs the requested telemeter. An analog phone is required as these lines are the only type of connection that is compatible with Unitil electric meters.
- Unitil technicians will install the interface between the phone line and the telemeter.
- A dedicated phone line is required; it cannot be shared. A shared phone line causes problems for the customer and Unitil when trying to communicate with the meter. (A dedicated “analog” phone extension is acceptable).
- The phone number for the telemeter (and extension number if applicable) is required as soon as it is known by the customer and this information is passed to Unitil.
- Unitil will not schedule installation of telemetering until the customer notifies Unitil that the phone line is installed per instructions above. This requirement allows Unitil to access the meter daily via its telemetering system as soon as the meter and service has been energized. This eliminates the need to make physical trips to the meter to manually read it.
- When the customer calls to schedule installation of telemeter, please give Unitil a contact person and phone number to contact on-site if issues with installation occur. This customer contact should be familiar with the specific phone installation.
- The electric telemetered meter is called directly and captures the register readings and interval data every night after midnight.
- The phone line should terminate inside the electric meter socket. An additional 10 feet of phone line that the Unitil technicians can work with.

- An RJ-11 4P4C (4 pin; 4 conductor) connector is attached to Unitil electric meter “analog” modems. An additional Male RJ11 Jack will terminate the phone line provided by the customer and a female to female coupling unit will be provided to tie the two lines together or the male RJ-11 connector can be plugged into an RJ-11 phone jack installed by the customer.



- An RJ-11 (4P4C) phone jack is wired as shown below. Only two wires are required on pins 2 & 3 (red & green conductors)





- Unitil will test the phone circuit by connecting an analog phone to this phone jack and the Unitil technician will call out to a known phone number to confirm voice communications.
- Unitil will also call the phone number of this phone jack to ensure phone number is correct. Once this has been verified, our MV-90 telecommunications will operate correctly.
- IP communications to cell modems are not supported by Unitil.