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# METER SOCKETS AND TEST SWITCHES

*GLEMS*
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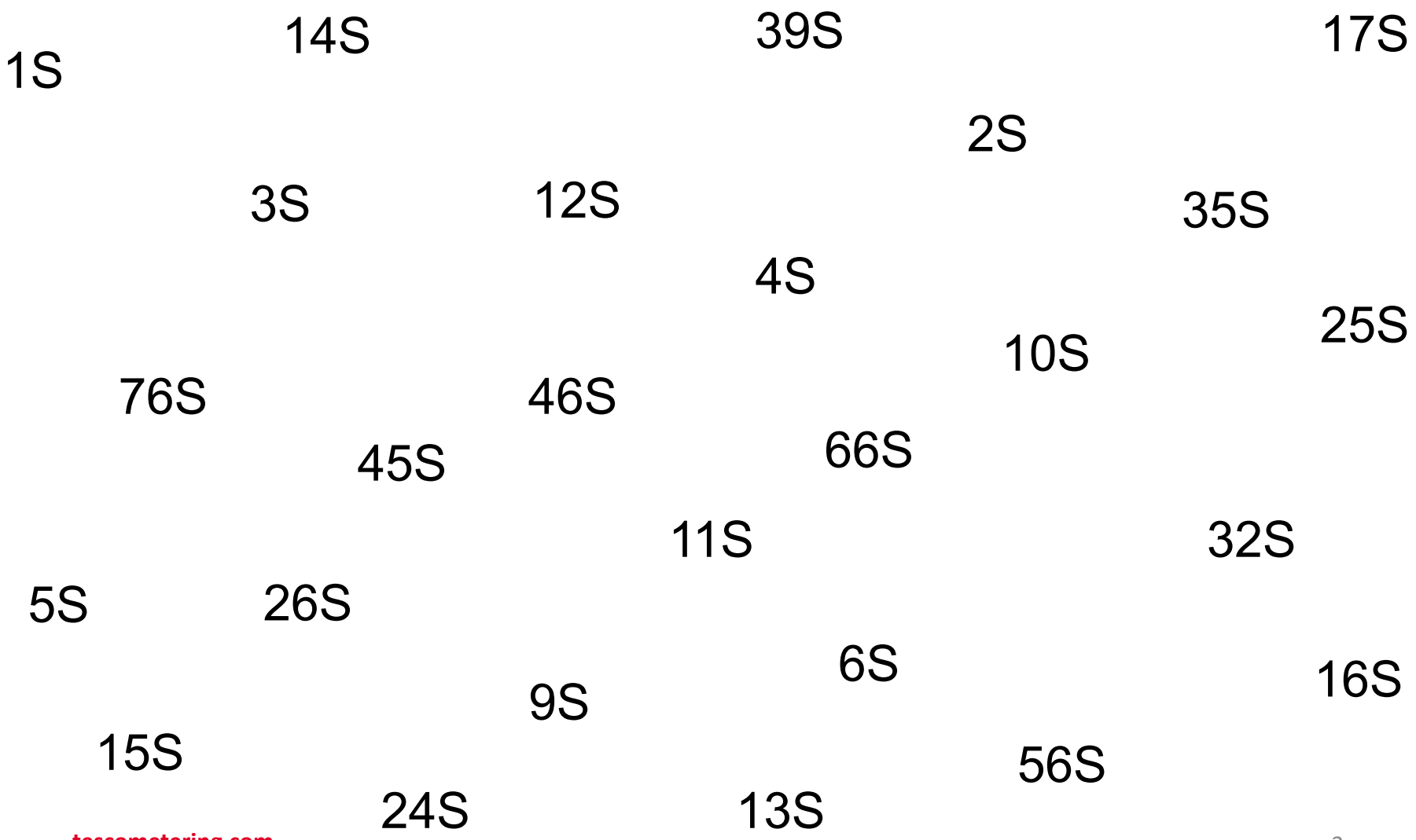
tescometering.com

# TOPICS

- Transformer Rated Meter Applications
- Sockets
- Test Switches
- Hot Sockets

# Self-Contained vs. Transformer-Rated



# SELF-CONTAINED VS. TRANSFORMER-RATED

## SELF-CONTAINED

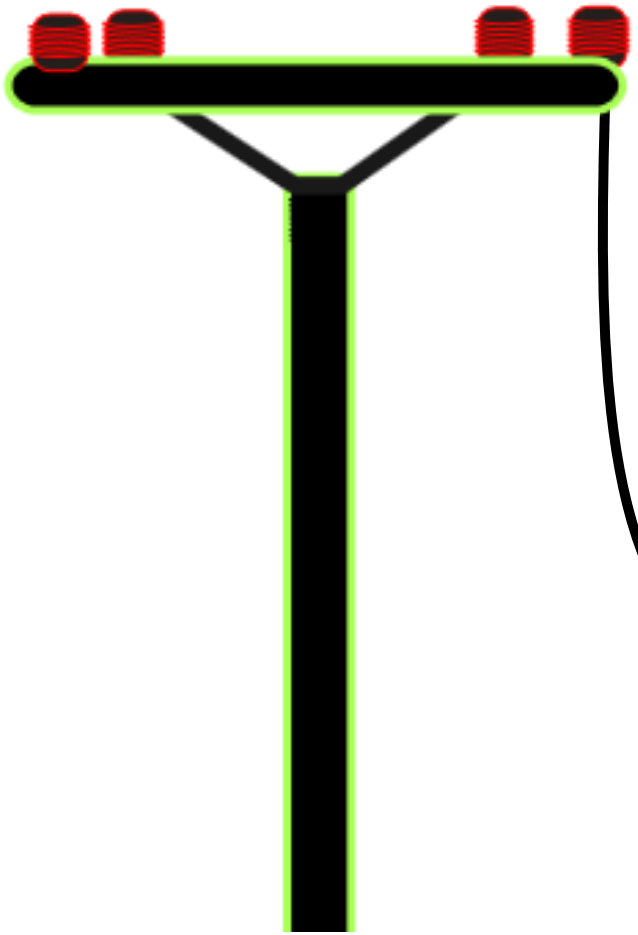
1S
14S
2S
12S
25S
16S
17S
13S
15S
32S

## TRANSFORMER RATED

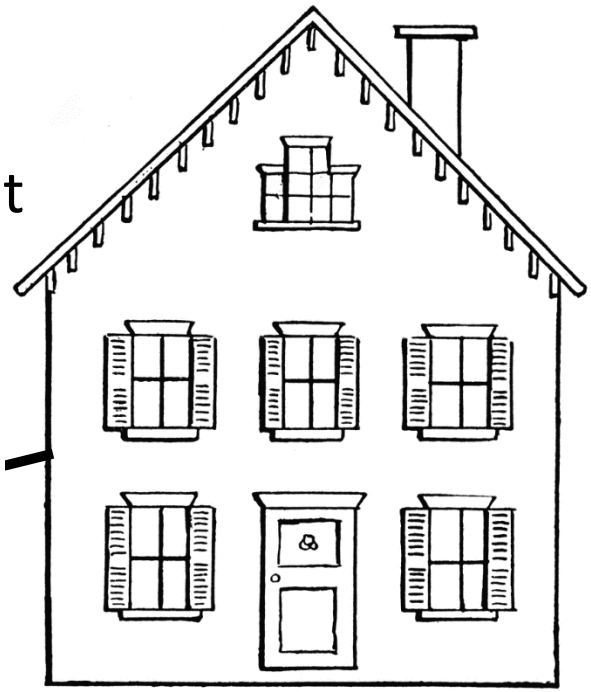
39S
36S
7S
3S
29S
76S
5S
35S
4S
46S
8S
26S
11S
66S
45S
6S
9S
10S
56S
24S

# Self-Contained vs. Transformer-Rated

Primarily Residential
(1S, 2S, 12S)

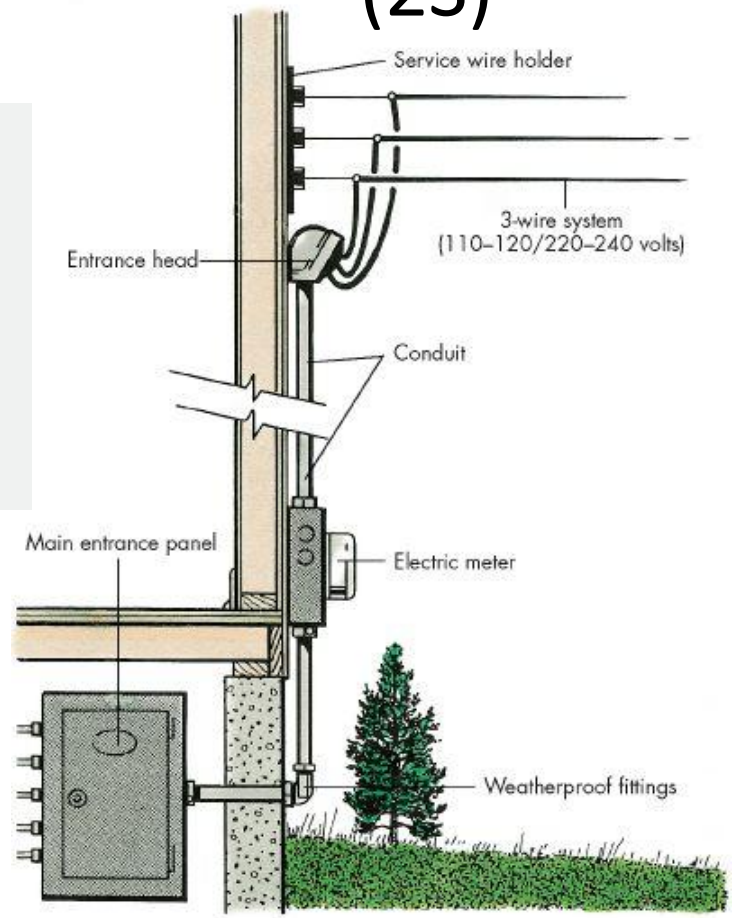


Relatively Low Current
Example: 100A



# Self-Contained Metering

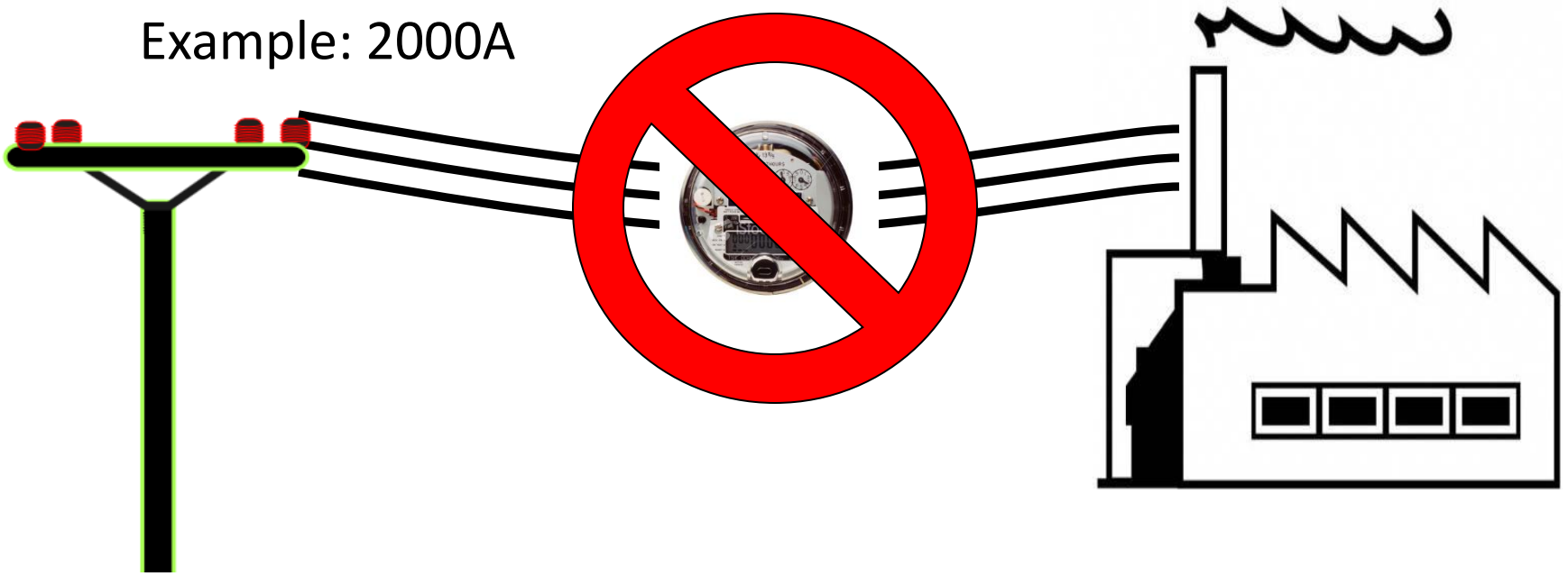
## Primarily Residential (2S)


# Self-Contained vs. Transformer-Rated

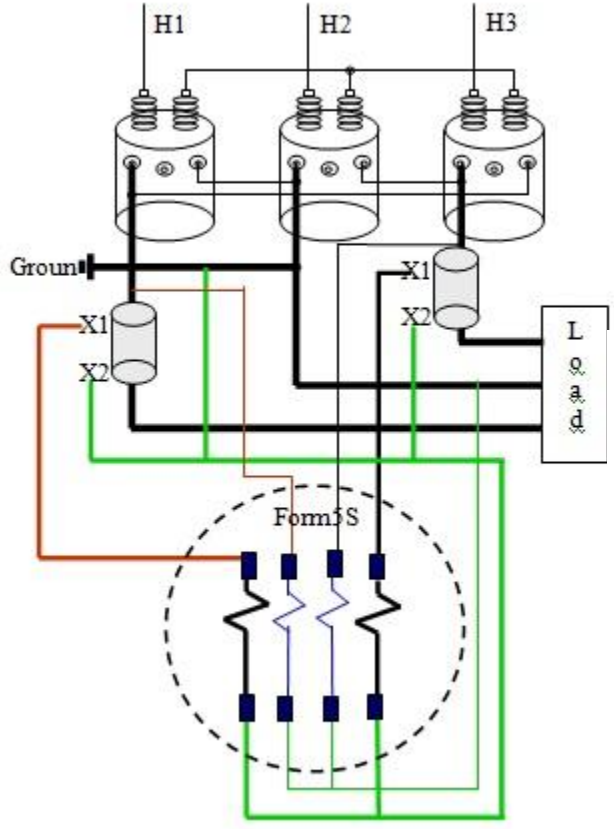
## Primarily Commercial/Industrial (9S)

Relatively High Current
Example: 2000A



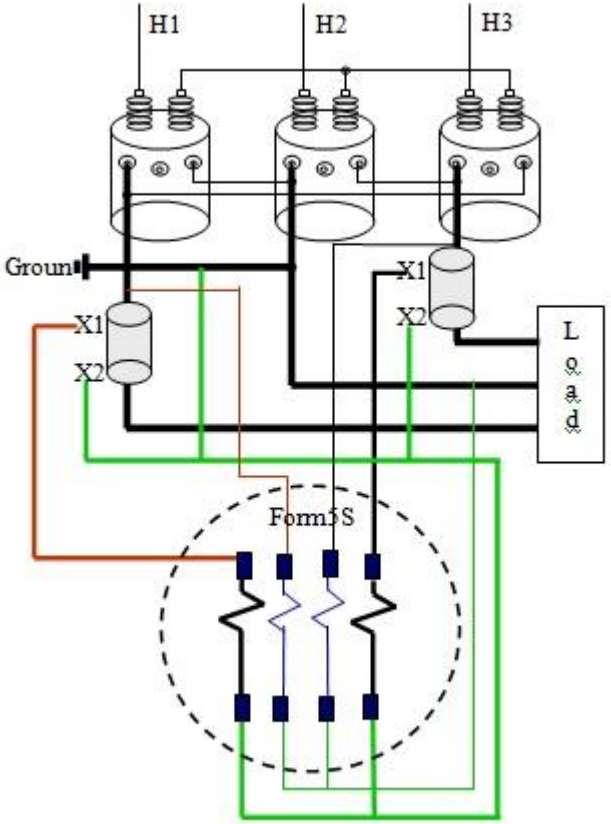
# TRANSFORMER-RATED METERING

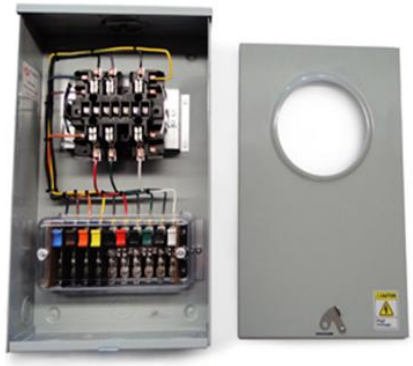
## Primarily Commercial/Industrial (9S)




# TRANSFORMER-RATED METERING

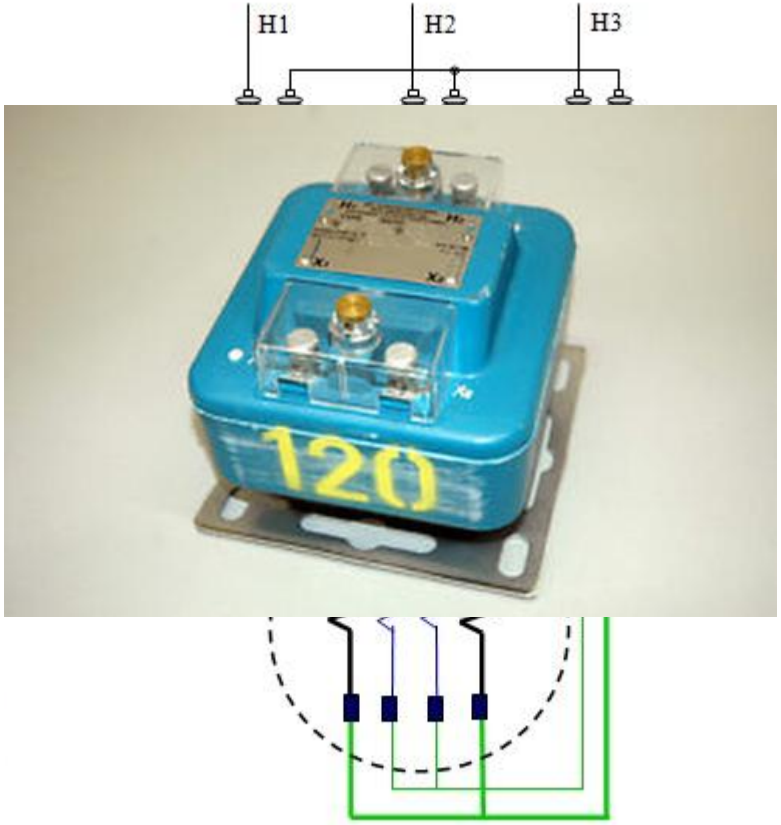
## Typical Components of an Installation

# TRANSFORMER-RATED METERING

## PT/VT –Voltage Transformer




# TRANSFORMER-RATED METERING

## PT/VT –Voltage Transformer

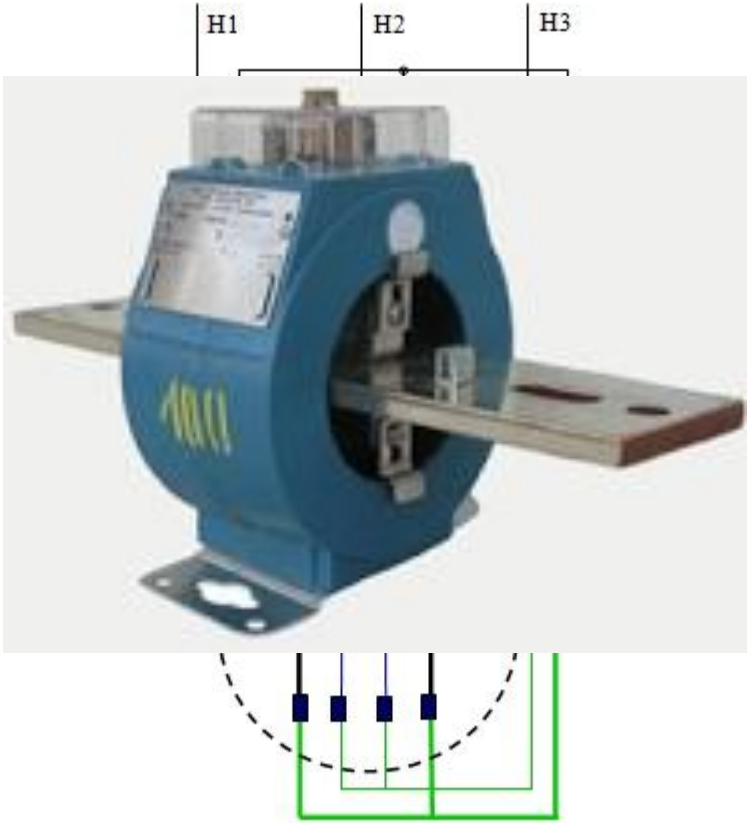
PT/VT

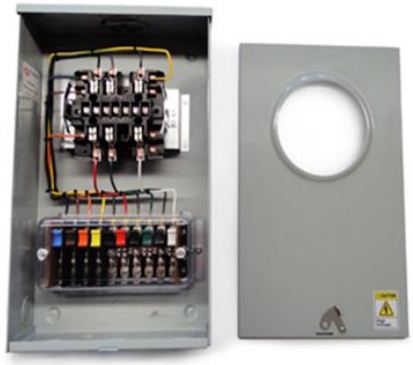
- Scales Down the Voltage
  - 4:1
  - 480V:120V


**PAGES 23-26**

# TRANSFORMER-RATED METERING

## CT – Current Transformer

**PAGES 23-26**

# TRANSFORMER-RATED METERING

## CT – Current Transformer

CT

- Scales Down the Current
  - 400:5
  - 800A:10A

**PAGES 23-26**

# TRANSFORMER-RATED METERING

## Meter



# METERS 101 – A-BASE, K-BASE, S-BASE

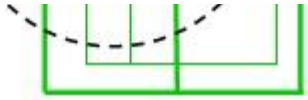
K-base


A-base

S-base

# TRANSFORMER-RATED METERING

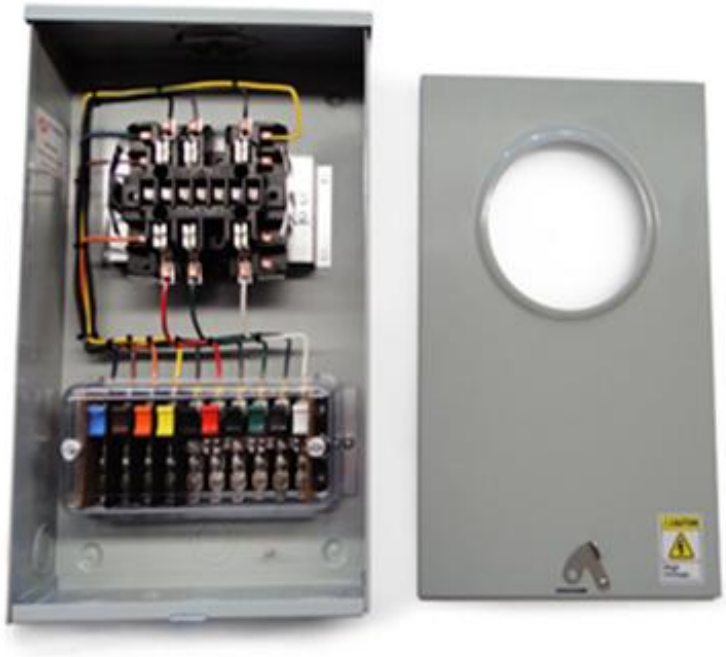
## Enclosure, Socket, Test Switch

# Transformer-Rated Metering

## Enclosure

- Painted Steel or Aluminum
  - One or Two Piece Lid
  - Various Knock-outs and hubs
- Many, Many Configurations



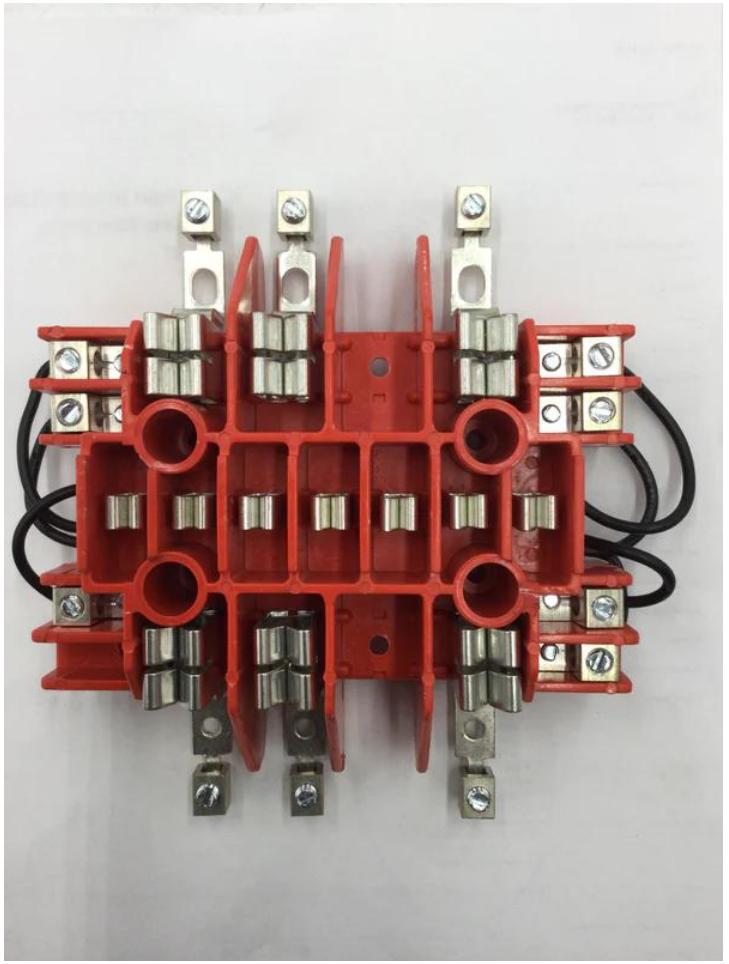
# TRANSFORMER-RATED METERING

## Trans-Sockets

# Transformer-Rated Metering

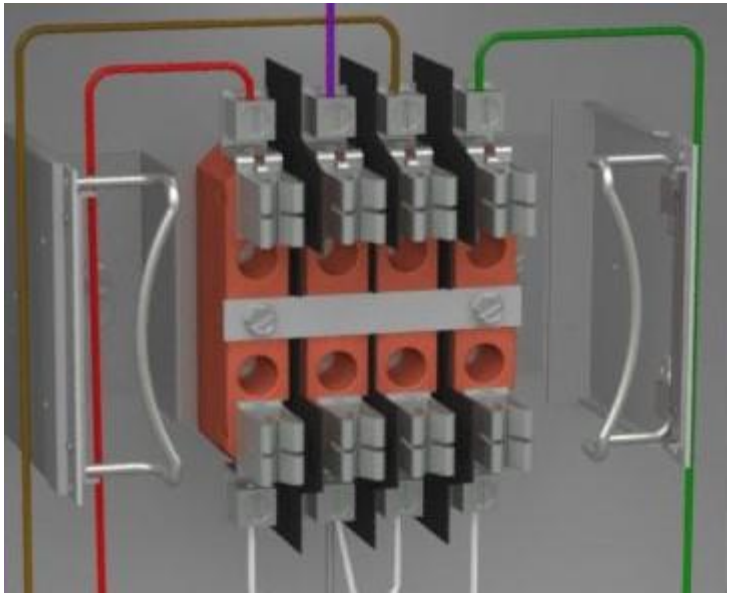
## Socket

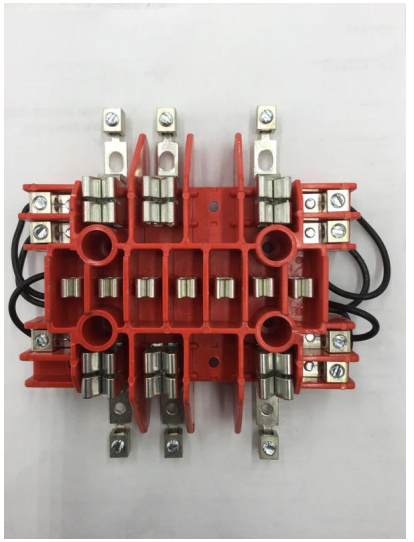
- Configured for Specific Form



# TRANSFORMER-RATED METERING

## Socket





# TRANSFORMER-RATED METERING

## Test Switch

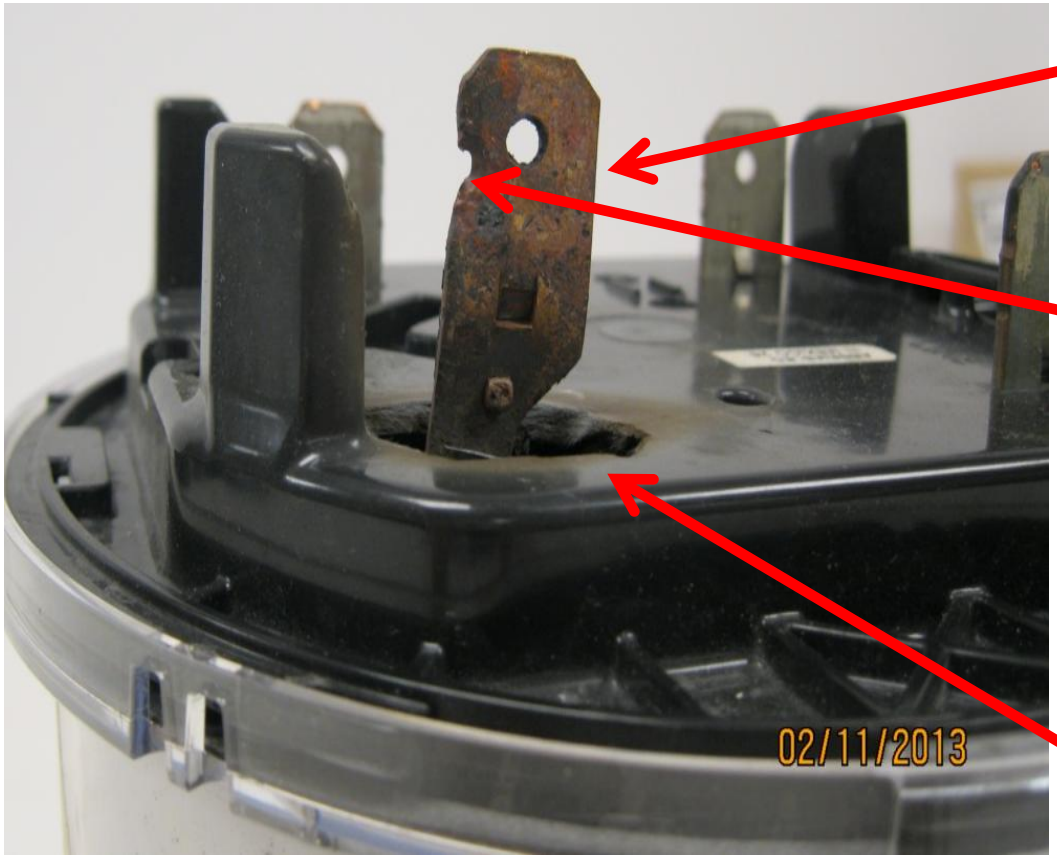
- Upmost Safety
  - Shuts the CT
- Isolates the Meter from the Service During Testing

# What is a Hot Socket?

- Hot Sockets are not a new phenomenon. Virtually every meter man has pulled a meter with a portion of the meter base around a blade melted and virtually every utility has been called to assist in the investigation of a fire at a meter box.
- AMI deployments because of the volume of meters involved put a spot light on this issue.
  - What causes a hot socket?
  - Are the meters ever the cause of a meter box failure?
  - What are the things to look for when inspecting an existing meter installation?
  - What are the best practices for handling potential hot sockets?
- This presentation will cover the results of our lab investigation into the sources for hot sockets, the development of a fixture to simulate hot sockets, the tests and data gleaned from hot sockets, and a discussion of “best practices” regarding hot sockets.

# Searching for Hot Socket Sources

## Common Features and Common Sources of Concern



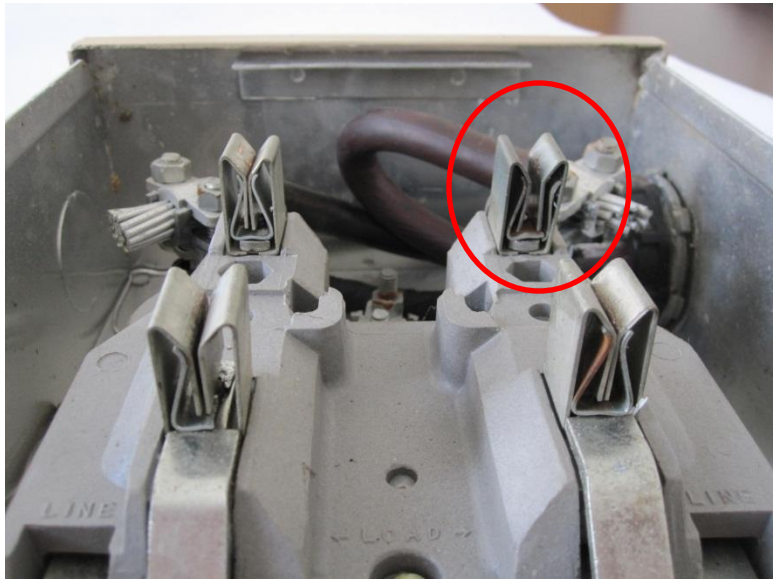

Tin burned off

Blade hole due to arcing to jaw – Copper melts at 1040ºC (1900ºF)

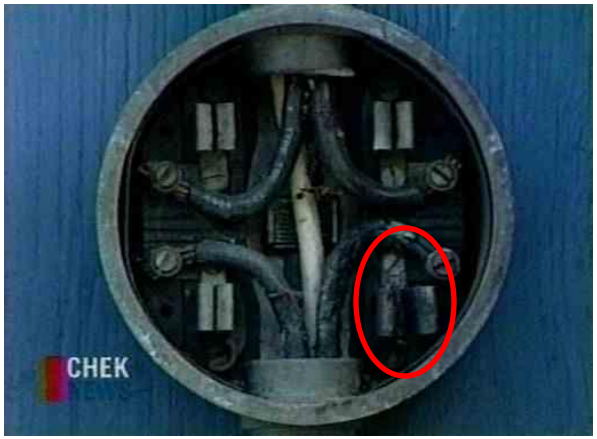
AX-SD base thermoset plastic melts at 960ºC (1760ºF)

# Searching for Hot Socket Sources

## Common Features and Common Sources of Concern

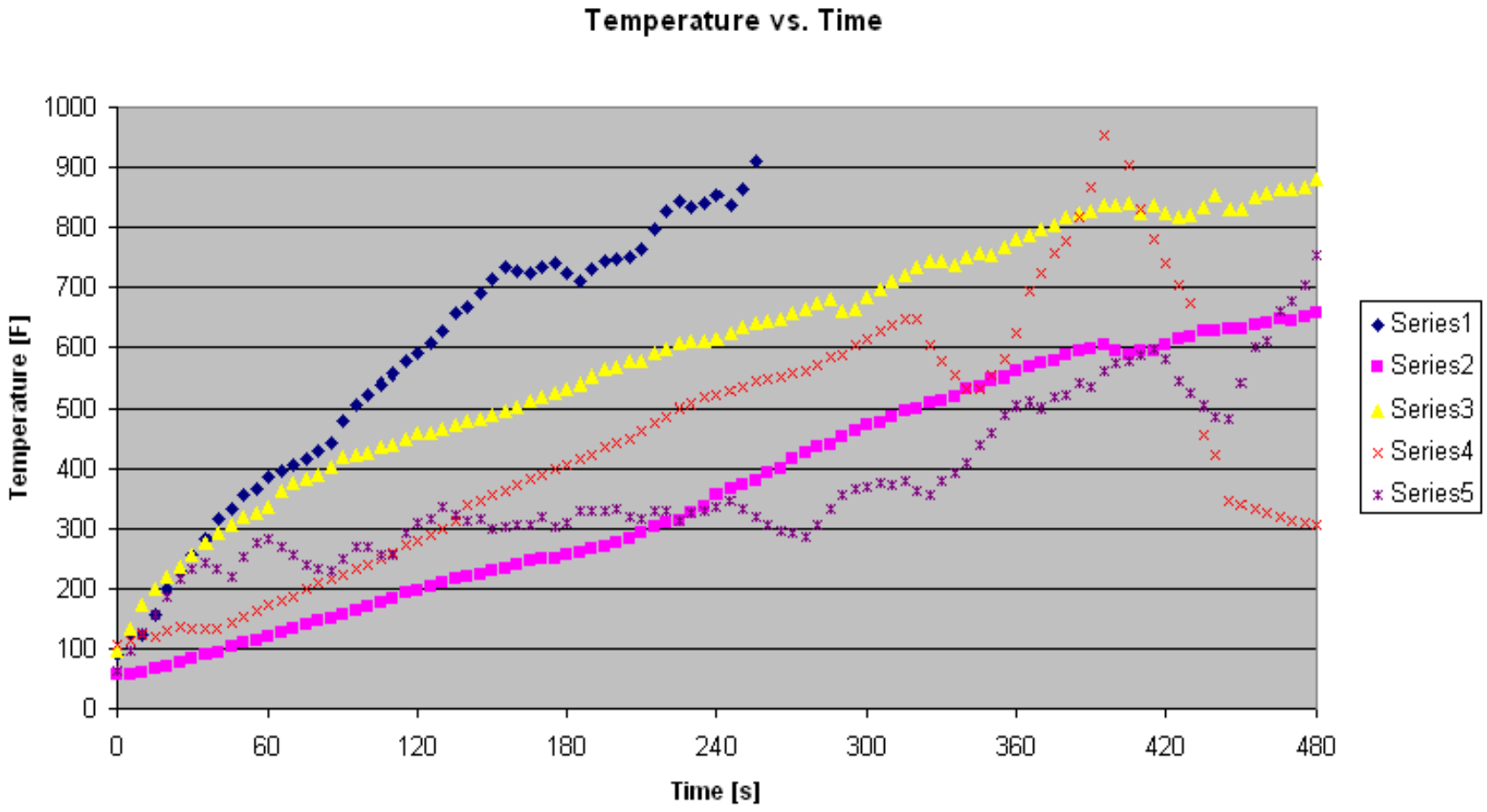


- Pitted and discolored meter blades
- Melted plastic around one or more of the meter stabs (typically the plastic around one stab is where the deformation starts)
- Pitted and discolored socket jaws
- Loss of spring tension in the socket jaws



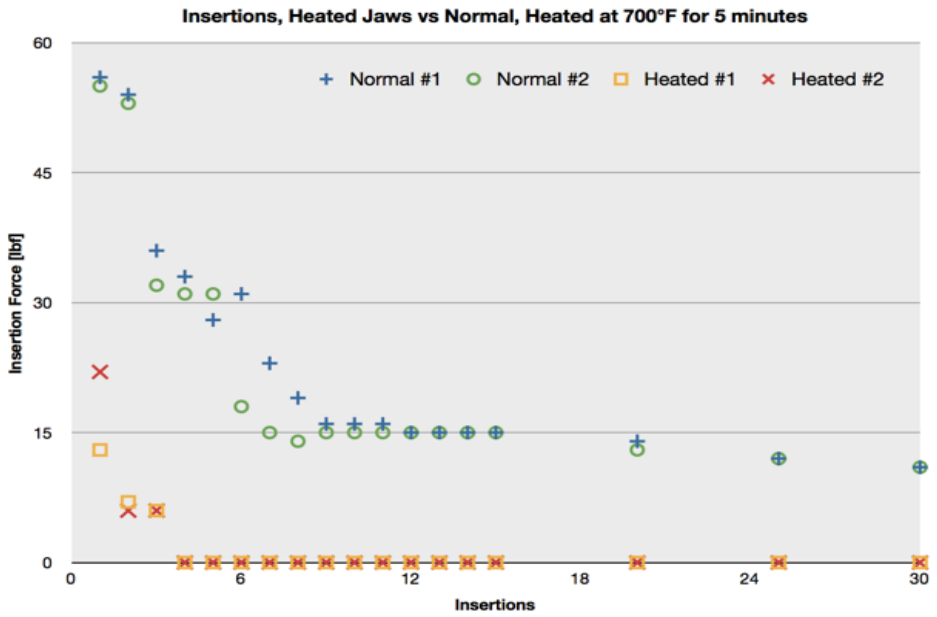
# Lab Testing - Hot Socket Simulation Fixture

# Temperature Rise Data



# Socket Analysis

| Insertions | Normal #1 | Normal #2 | Heated #1 | Heated #2 |
|---|---|---|---|---|
| 1 | 56 | 55 | 13 | 22 |
| 2 | 54 | 53 | 7 | 6 |
| 3 | 36 | 32 | 6 | 6 |
| 4 | 33 | 31 | 0 | 0 |
| 5 | 28 | 31 | 0 | 0 |
| 6 | 31 | 18 | 0 | 0 |
| 7 | 23 | 15 | 0 | 0 |
| 8 | 19 | 14 | 0 | 0 |
| 9 | 16 | 15 | 0 | 0 |
| 10 | 16 | 15 | 0 | 0 |
| 11 | 16 | 15 | 0 | 0 |
| 12 | 15 | 15 | 0 | 0 |
| 13 | 15 | 15 | 0 | 0 |
| 14 | 15 | 15 | 0 | 0 |
| 15 | 15 | 15 | 0 | 0 |
| 20 | 14 | 13 | 0 | 0 |
| 25 | 12 | 12 | 0 | 0 |
| 30 | 11 | 11 | 0 | 0 |



# Defense and Protection Against Hot Sockets – Jaw Tension Testers

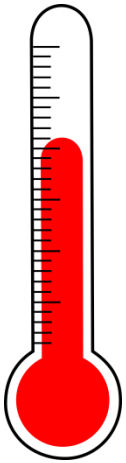

TESCO Cat no 300

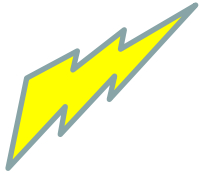


Brooks Cat no 8400 SJT

# Defense and Protection Against Hot Sockets – High Temp and Arc Alarms

High Temp Alarms



Arc Sensing Technology

# What can be done once a hot socket is identified?

- Easiest resolution is to replace the damaged jaw.
- **Never** try and repair a damaged jaw. The tension in the damaged jaw will not return simply by taking a pair of pliers and closing the jaw tighter.
- Either the entire box should be replaced or the damaged jaw (assuming the wiring and other jaws are deemed safe through the rest of the inspection.)


# Questions and Discussion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