

SIERRA COLLEGE

**Class 10**

***Energy Instructor***

[www.energyinstructor.info](http://www.energyinstructor.info)

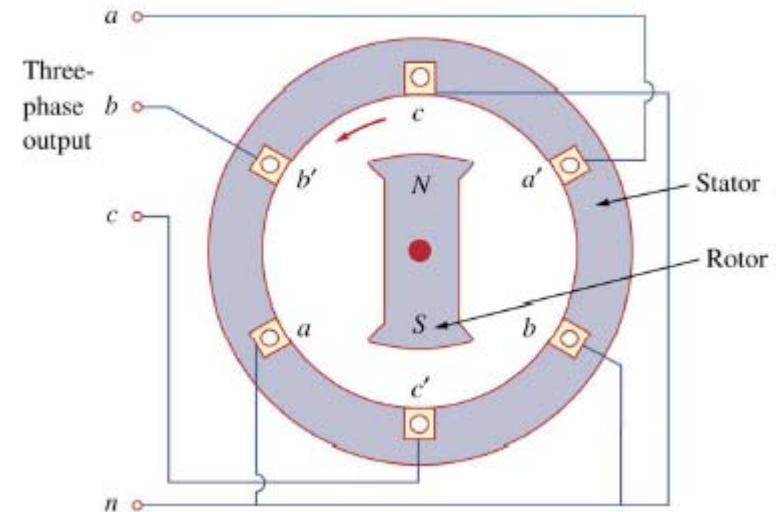
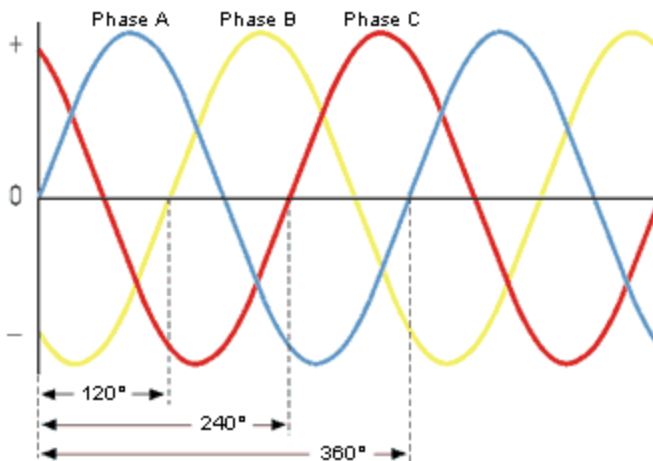


# Lesson Plan

- Discussion re 3 phase power and transformers - REVIEW
- Saturday Session – Rocklin campus, 8a
  - Safety First
  - Eye Pro
  - Hydrate, and sun screen

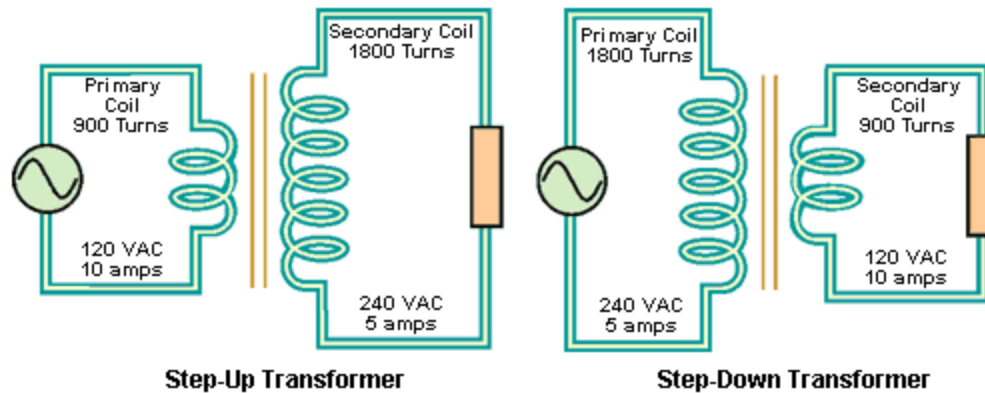
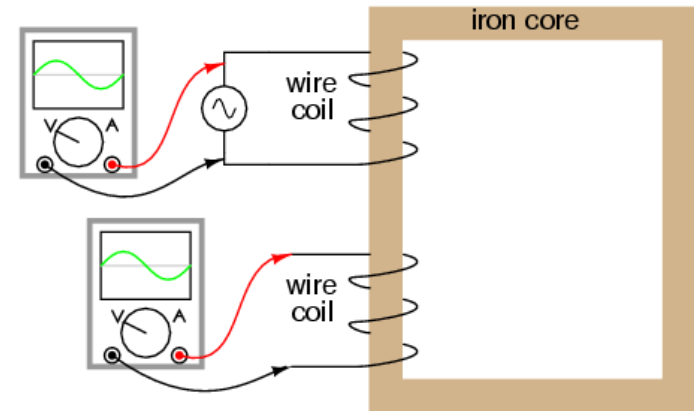
# Transformers and 3-phase power

- Why do we care?
- Where do we start?
  - AC/DC wars ..... Who won, who lost, why?
  - How do generators and motors work?
  - How is electricity distributed today?



# Transformers and 3-phase power

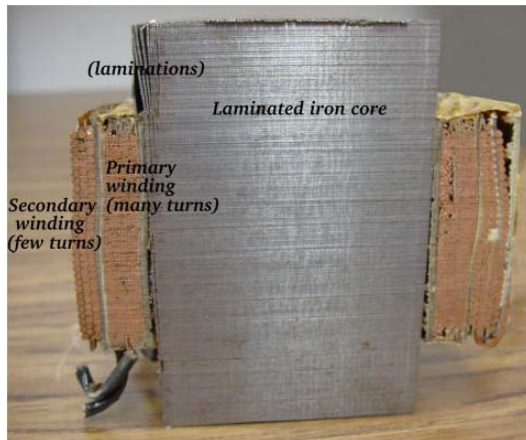
- What do transformers do?
- How do they work?
- Windings and Voltage
  - $V_1/N_1 = V_2/N_2$
  - $V_1/V_2 = N_1/N_2$



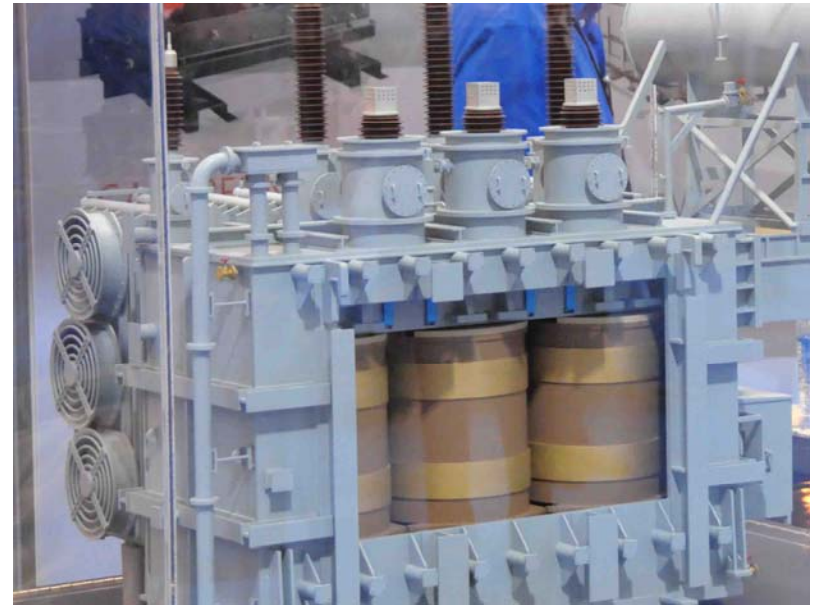
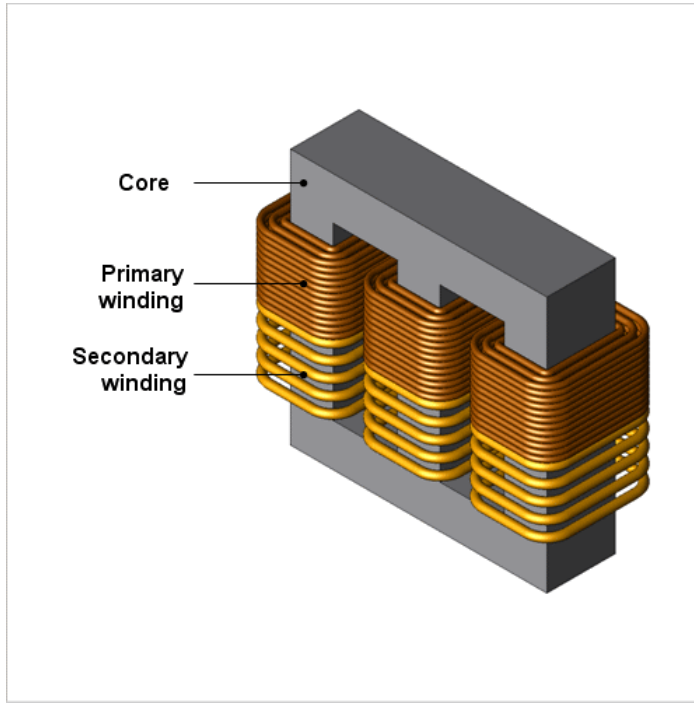
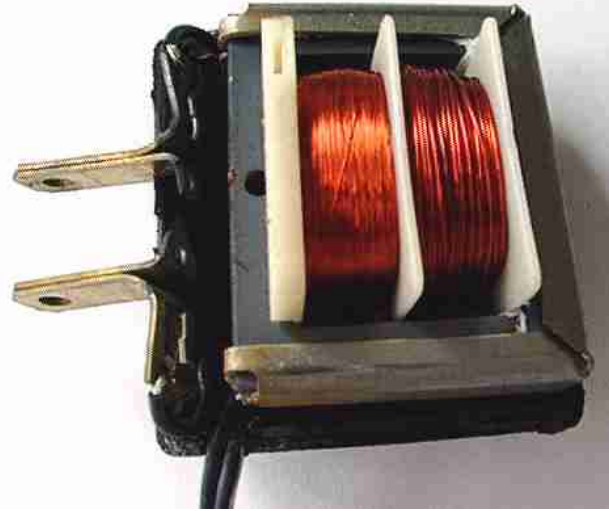
# Transformers and 3-phase power

**Energy Instructor**

[www.energyinstructor.info](http://www.energyinstructor.info)

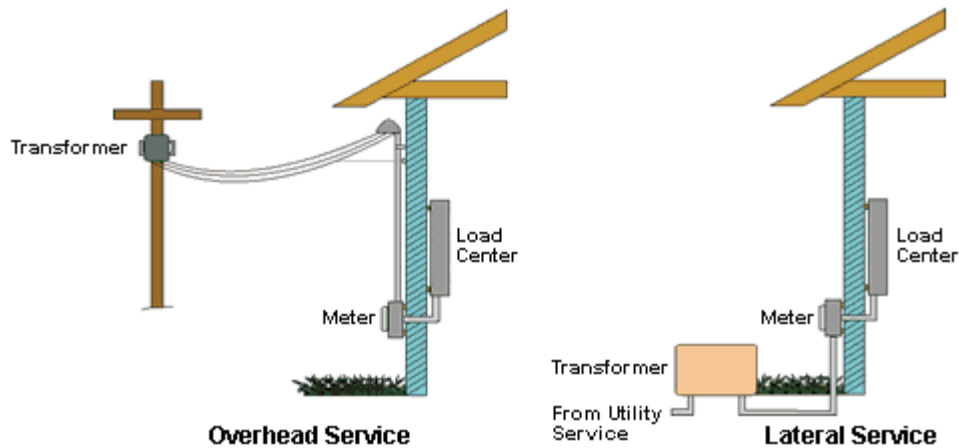
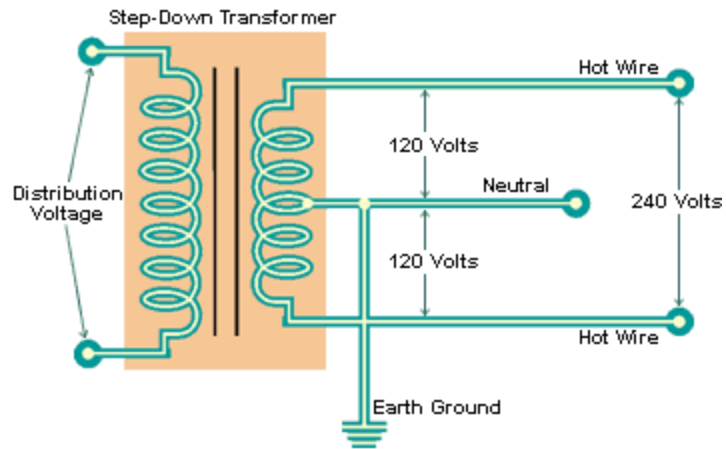


# Transformers and 3-phase power



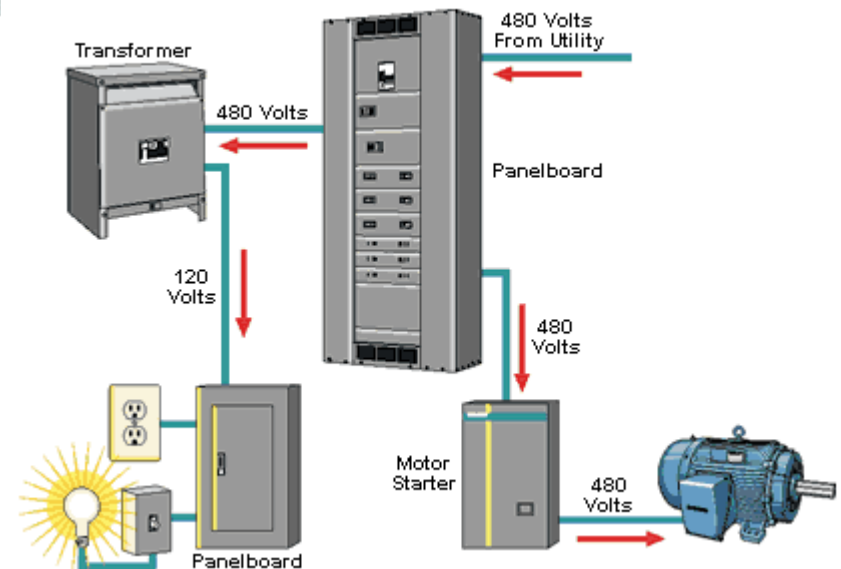
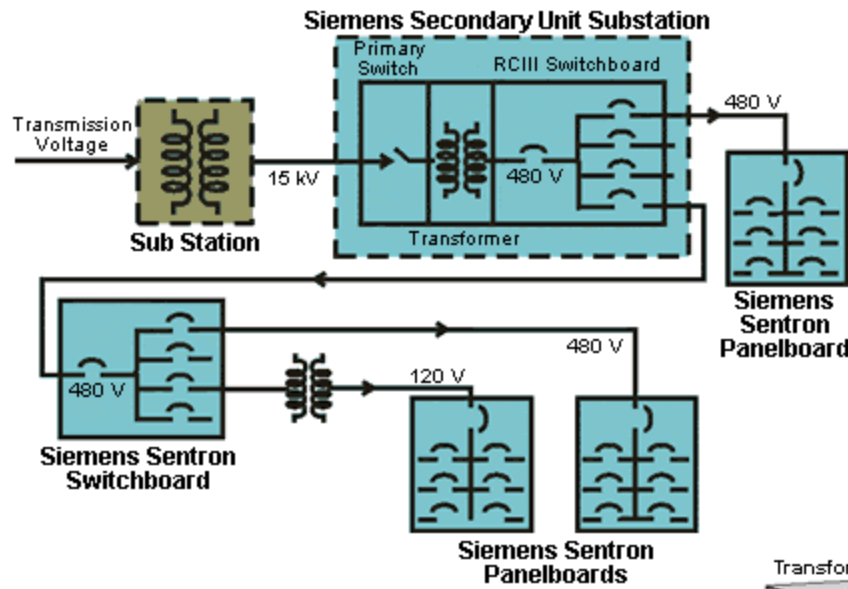
# Transformers and 3-phase power

- Typical residential application



# Transformers and 3-phase power

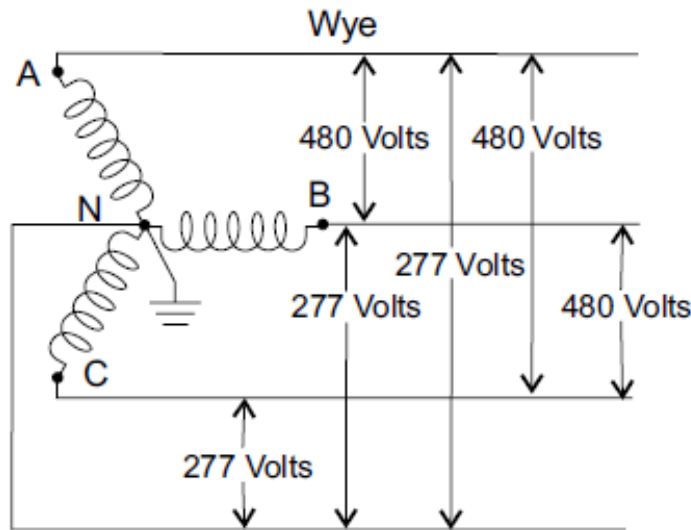
- Typical commercial application



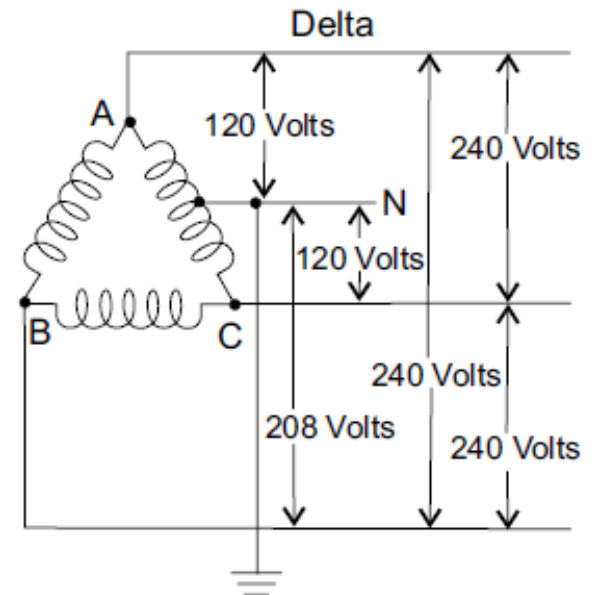


# Transformers and 3-phase power

- Three phase wiring



A - B 480 Volts  
B - C 480 Volts  
C - A 480 Volts  
A - N 277 Volts  
B - N 277 Volts  
C - N 277 Volts

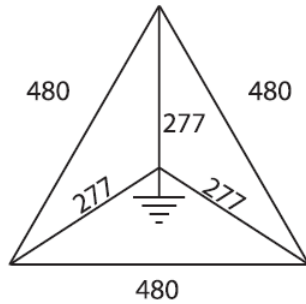


A - B 240 Volts  
B - C 240 Volts  
C - A 240 Volts  
A - N 120 Volts  
B - N 208 Volts  
C - N 120 Volts

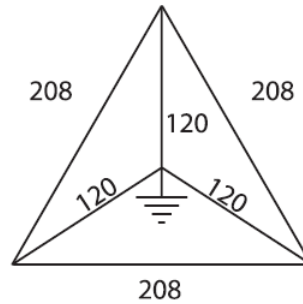
# Transformers and 3-phase power

- Three phase wiring

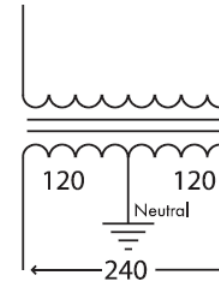
**480 Delta: 277 WYE**



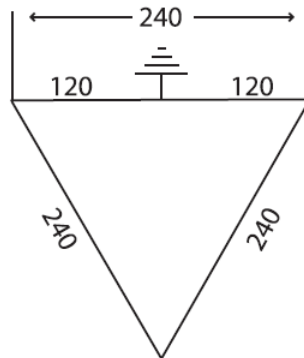
**208 Delta: 120 WYE \***



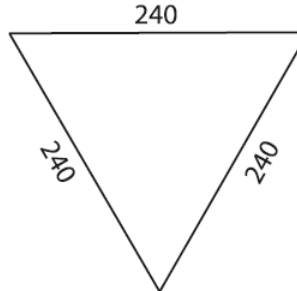
**240: 120 Split Phase**



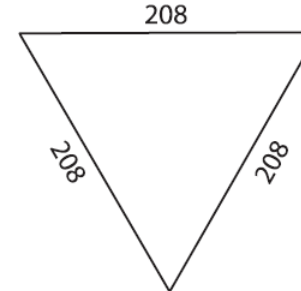
**240 Delta: 120 Stinger**



**240 Delta**

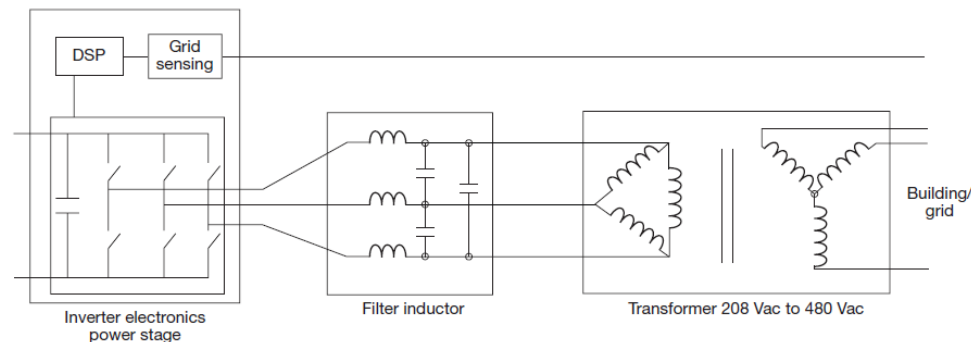
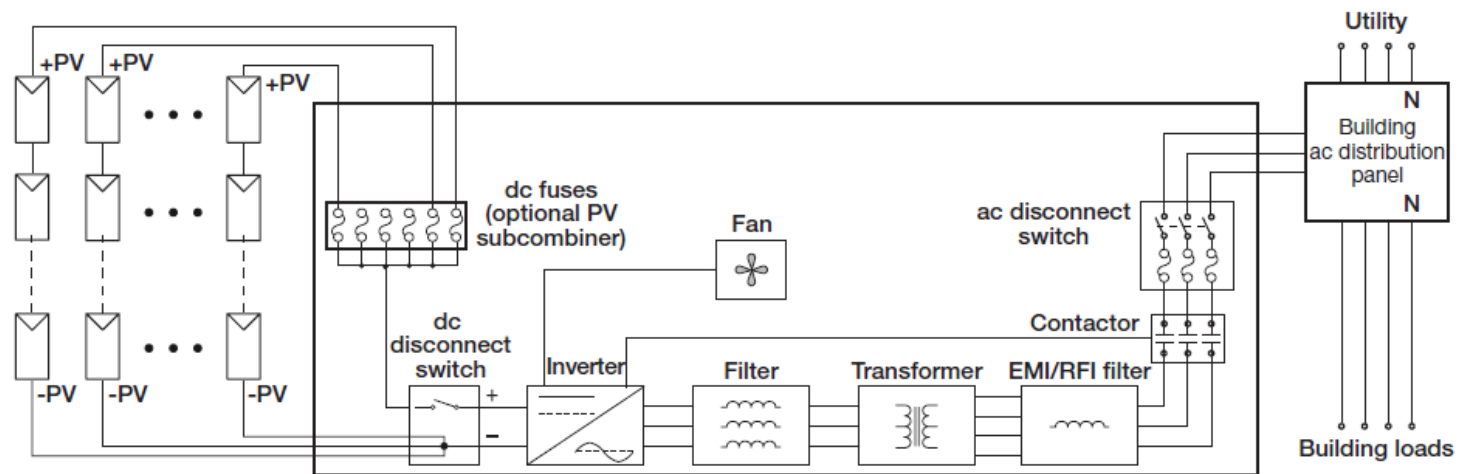


**208 Delta \***



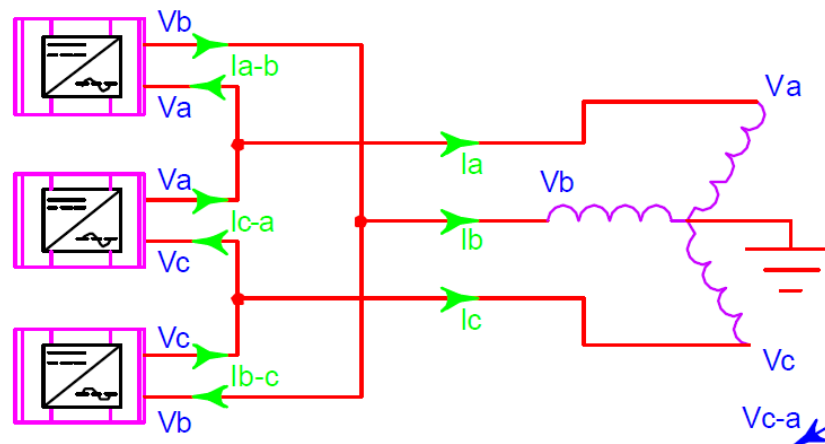
# Transformers and 3-phase power

- How do we design a 3-phase PV system
- Use a 3-phase inverter



# Transformers and 3-phase power

- How do we design a 3-phase PV system
- Use multiple single phase inverters



- What is the OCPD rating for inverter output?  
(max AC output of SB6000US at 208V = 29A)  
 $29A * 1.25 = 36.25A$  next size = 40A
- What is the OCPD rating of each phase? 40A
- What is the OCPD for the 3 phase subpanel?  
 $29A * \sqrt{3} * 1.25 = 50.2A * 1.25 = 62.8A$  next size = 70A