Technical

Ohms Law and Wiring Diagrams

Ohms Law

E = Volts, W = Watts, I = Amperes, R = Ohms

To Determine Watts (W):

$W = EI \quad W = I^2R \quad W = \frac{E^2}{R}$

To Determine Volts (E):

$E = \sqrt{WR} \quad E = \frac{W}{I} \quad E = IR$

To Determine Ohms (R):

$R = \frac{W}{I^2} \quad R = \frac{E^2}{W} \quad R = \frac{E}{I}$

To Determine Amperes (I):

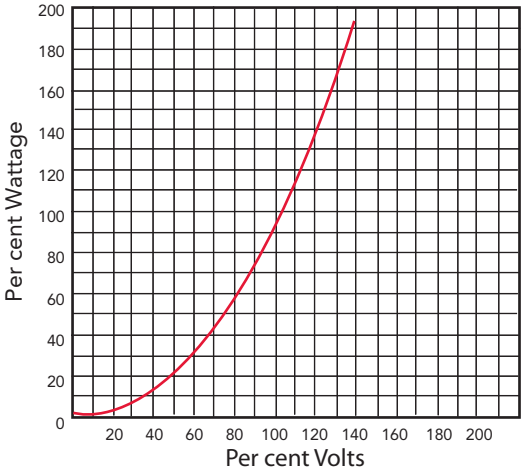
$I = \frac{E}{R} \quad I = \frac{W}{E} \quad I = \sqrt{\frac{W}{R}}$

Variation of Wattage with Voltage Change

$$W^2 = W^1\left(\frac{E^2}{E^1}\right)^2$$

E^2 = New Voltage
E^1 = Original Heater Voltage
W^2 = New Wattage
W^1 = Original Wattage

Percentage Variation of Voltage vs. Wattage



Wiring Diagrams

Fig. 1: 120V or 240V single phase two or more heaters in parallel with thermostat rating adequate for line voltage and current

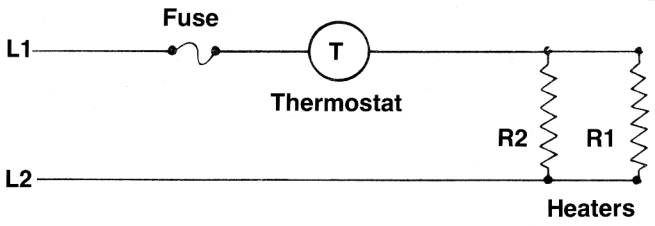


Fig. 2: 240V or 480V three phase deltas (three phase wye) with thermostat adequate for line voltage and current

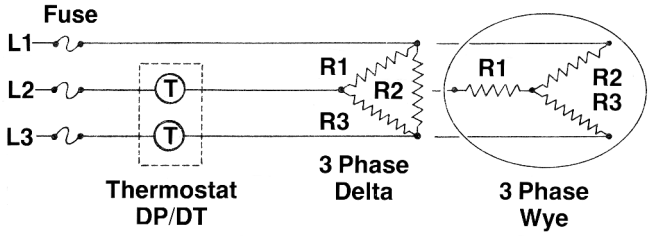


Fig. 3: 120V, 240V, 480V single phase two or more heaters in series with thermostat rating adequate for line voltage and current

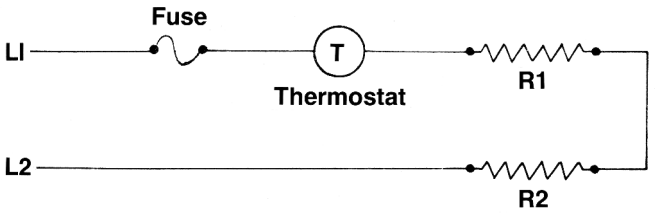
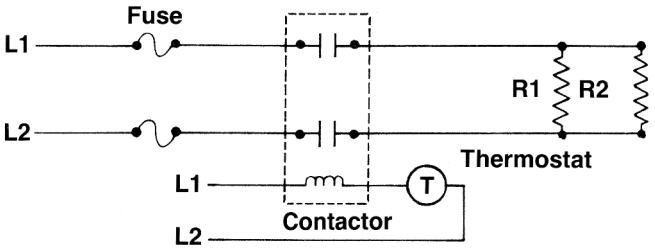


Fig. 4: Two or more heaters wired in parallel with thermostat not adequate for line current (or voltage)



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Wiring Diagrams

Fig. 5: Two or more heaters wired in parallel in each leg of a 3 phase delta circuit. Thermostat rating not adequate for line current or voltage.

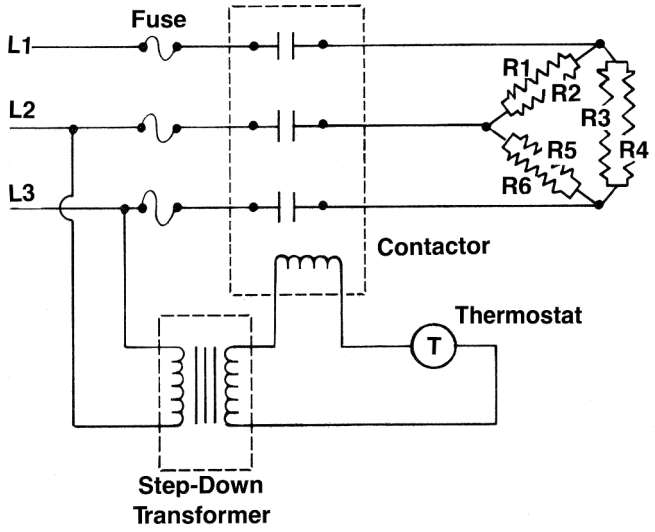


Fig. 6: Single phase or three phase AC only with properly rated SCR power control with thermocouple input temperature controller.

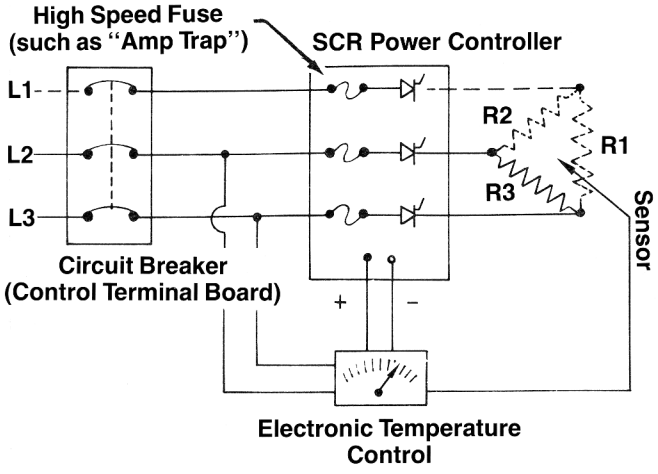


Fig. 7: Special circuit for switching from parallel operation in a 3 phase delta circuit to a pair in series operation, with both contractors closed. Circuit operates at full power at element rated voltage.

With either #1 or #2 contractor open, circuit operates at ¼ power, with voltage across each element at ½ rated voltage. Heater element wattages must be equal to give balanced 3 phase circuit for both circuits.

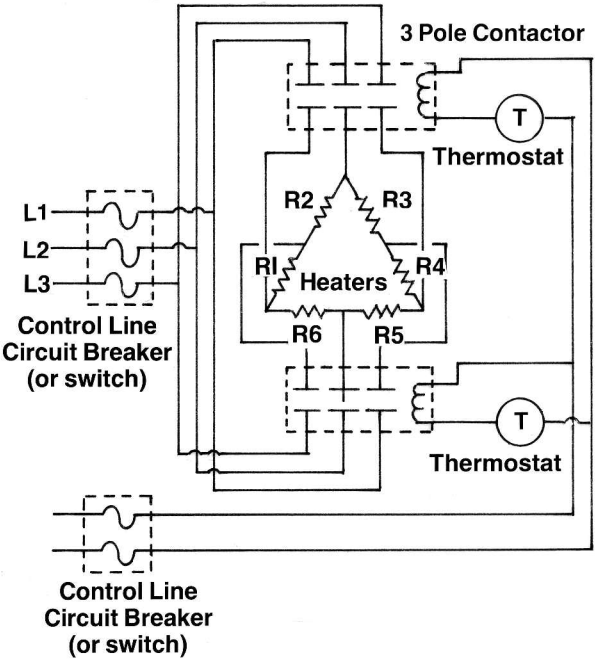
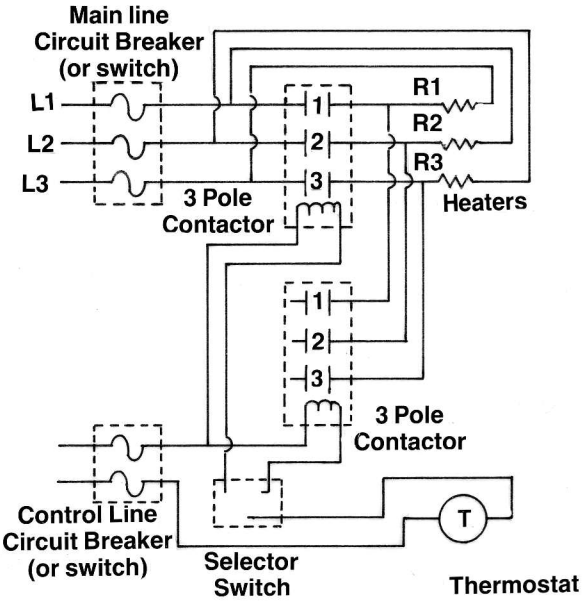


Fig. 8: Circuit for switching from a 3 phase delta circuit for full power to a 3 phase wye circuit at ⅓ power. Watt density of heaters is also dropped to ⅓ of original.



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