



## Wiring Information

### Amperage Conversion Table

| Watts | Volts Single Phase |      |      | Volts 3 Phase Balanced Load |      | Watts |
|-------|--------------------|------|------|-----------------------------|------|-------|
|       | 120                | 240  | 480  | 240                         | 480  |       |
| 100   | 0.83               | 0.42 | 0.21 | 0.24                        | 0.12 | 100   |
| 150   | 1.3                | 0.63 | 0.31 | 0.36                        | 0.18 | 150   |
| 200   | 1.7                | 0.83 | 0.42 | 0.48                        | 0.24 | 200   |
| 250   | 2.1                | 1.0  | 0.52 | 0.60                        | 0.30 | 250   |
| 300   | 2.5                | 1.3  | 0.63 | 0.72                        | 0.36 | 300   |
| 350   | 2.9                | 1.5  | 0.73 | 0.84                        | 0.42 | 350   |
| 400   | 3.3                | 1.7  | 0.83 | 1.0                         | 0.48 | 400   |
| 450   | 3.8                | 1.9  | 0.94 | 1.1                         | 0.54 | 450   |
| 500   | 4.2                | 2.1  | 1.0  | 1.2                         | 0.60 | 500   |
| 600   | 5.0                | 2.5  | 1.3  | 1.4                         | 0.72 | 600   |
| 700   | 5.8                | 2.9  | 1.5  | 1.7                         | 0.84 | 700   |
| 750   | 6.3                | 3.1  | 1.6  | 1.8                         | 0.90 | 750   |
| 800   | 6.7                | 3.3  | 1.7  | 1.9                         | 1.0  | 800   |
| 900   | 7.5                | 3.8  | 1.9  | 2.2                         | 1.1  | 900   |
| 1000  | 8.3                | 4.2  | 2.1  | 2.4                         | 1.2  | 1000  |
| 1100  | 9.2                | 4.6  | 2.3  | 2.6                         | 1.3  | 1100  |
| 1200  | 10.0               | 5.0  | 2.5  | 2.9                         | 1.4  | 1200  |
| 1250  | 10.4               | 5.2  | 2.6  | 3.0                         | 1.5  | 1250  |
| 1300  | 10.8               | 5.4  | 2.7  | 3.1                         | 1.6  | 1300  |
| 1400  | 11.7               | 5.8  | 2.9  | 3.4                         | 1.7  | 1400  |
| 1500  | 12.5               | 6.3  | 3.1  | 3.6                         | 1.8  | 1500  |
| 1600  | 13.3               | 6.7  | 3.3  | 3.8                         | 1.9  | 1600  |
| 1700  | 14.2               | 7.1  | 3.5  | 4.1                         | 2.0  | 1700  |
| 1750  | 14.6               | 7.3  | 3.6  | 4.2                         | 2.1  | 1750  |
| 1800  | 15.0               | 7.5  | 3.8  | 4.3                         | 2.2  | 1800  |
| 1900  | 15.8               | 7.9  | 4.0  | 4.6                         | 2.3  | 1900  |
| 2000  | 16.7               | 8.3  | 4.2  | 4.8                         | 2.4  | 2000  |
| 2200  | 18.3               | 9.2  | 4.6  | 5.3                         | 2.6  | 2200  |
| 2500  | 20.8               | 10.4 | 5.2  | 6.0                         | 3.0  | 2500  |
| 2750  | 22.9               | 11.5 | 5.7  | 6.6                         | 3.3  | 2750  |
| 3000  | 25.0               | 12.5 | 6.3  | 7.2                         | 3.6  | 3000  |
| 3500  | 29.2               | 14.6 | 7.3  | 8.4                         | 4.2  | 3500  |
| 4000  | 33.3               | 16.7 | 8.3  | 9.6                         | 4.8  | 4000  |
| 4500  | 37.5               | 18.8 | 9.4  | 10.8                        | 5.4  | 4500  |
| 5000  | 41.7               | 20.8 | 10.4 | 12.0                        | 6.0  | 5000  |
| 6000  | 50.0               | 25.0 | 12.5 | 14.4                        | 7.2  | 6000  |
| 7000  | 58.3               | 29.2 | 14.6 | 16.8                        | 8.4  | 7000  |
| 8000  | 66.7               | 33.3 | 16.7 | 19.2                        | 9.6  | 8000  |
| 9000  | 75.0               | 37.5 | 18.8 | 21.7                        | 10.8 | 9000  |
| 10000 | 83.3               | 41.7 | 20.8 | 24.1                        | 12.0 | 10000 |

### Wiring Hints

1. Wire gauge, conductor material, and wire insulation choice depend upon current draw, electric service voltage and operating temperature. In high temperature environments, high temperature insulation and/or nickel coated copper or nickel conductors may be required.
2. Heater terminal connections should be tightened with maximum torque consistent with terminal strength. When possible, a wrench or pliers should be used to support the heater terminal to prevent it from twisting when tightening connections.
3. It is good wiring practice to run thermocouple circuit wiring in a separate conduit.
4. Thermostat capillary tubing must be kept away from heater terminals.

### Selection of Hook-Up Lead Wire Gauge

Approximate Current Carrying Capacities of High Temperature insulated Nickel (Grade "A") and Nickel Plated Copper wire based on ambient temperature of 40°C (104°F).

This table should only be used as a starting point when establishing ratings for any given situation. It is recommended that design engineers desiring accurate ampacity data refer to the current National Electric Code Handbook, Article 310-15-310-84.

### Current Carrying Capacity Table Ambient Temperature at 40°C (104°F)

| Conductor Size AWG | Conductor Type and Temperature Rating |                          |                          |                       |
|--------------------|---------------------------------------|--------------------------|--------------------------|-----------------------|
|                    | 250°C (482°F) "A" Nickel              | 250°C (482°F) NPC 2%-10% | 450°C (842°F) "A" Nickel | 450°C (842°F) NCC 27% |
| 24                 | 4                                     | 8                        | 4.3                      | 9                     |
| 22                 | 5                                     | 10.8                     | 5.6                      | 12                    |
| 20                 | 7                                     | 15                       | 8                        | 18                    |
| 18                 | 9.4                                   | 20                       | 11                       | 23                    |
| 16                 | 12                                    | 26                       | 14                       | 30                    |
| 14                 | 18                                    | 39                       | 21                       | 45                    |
| 12                 | 25                                    | 54                       | 26                       | 56                    |
| 10                 | 34                                    | 73                       | 35                       | 75                    |

For ambient temperatures other than 40°C (104°F), multiply the ampacities shown above by the appropriate factor shown below.

### Ambient Temperature Correction Factors

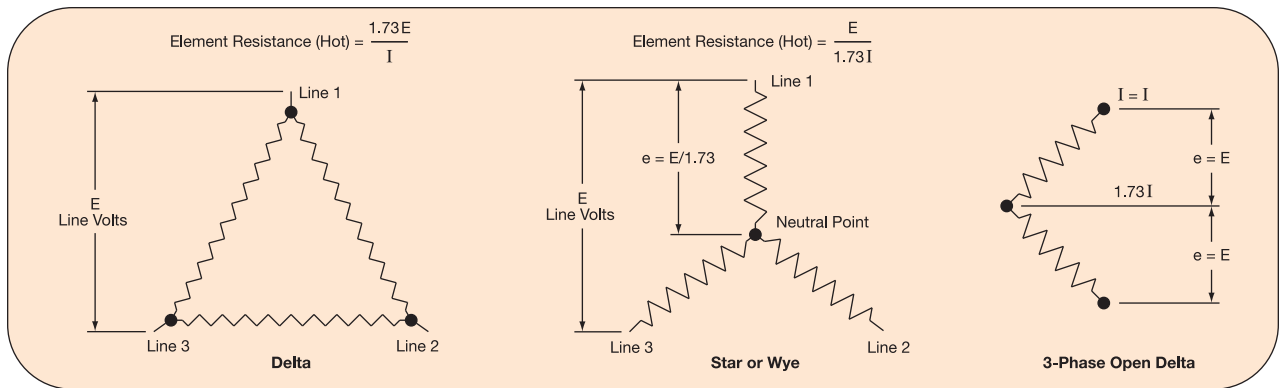
| Ambient Temperature °C | Wire Temperature Rating |               | Ambient Temperature °F |
|------------------------|-------------------------|---------------|------------------------|
|                        | 250°C (482°F)           | 450°C (842°F) |                        |
| 41-50                  | 0.98                    | 0.99          | 106-122                |
| 51-60                  | 0.95                    | 0.99          | 124-140                |
| 61-70                  | 0.93                    | 0.96          | 142-158                |
| 71-80                  | 0.9                     | 0.95          | 160-176                |
| 81-90                  | 0.87                    | 0.93          | 177-194                |
| 91-100                 | 0.85                    | 0.92          | 195-212                |
| 101-120                | 0.79                    | 0.89          | 213-248                |
| 121-140                | 0.71                    | 0.86          | 249-284                |
| 141-160                | 0.65                    | 0.84          | 285-320                |
| 161-180                | 0.58                    | 0.81          | 321-356                |
| 181-200                | 0.49                    | 0.78          | 357-392                |
| 201-225                | 0.35                    | 0.74          | 393-437                |
| 226-250                | —                       | 0.69          | 439-482                |
| 251-275                | —                       | 0.65          | 483-527                |
| 276-300                | —                       | 0.6           | 528-572                |
| 301-325                | —                       | 0.55          | 573-617                |
| 326-350                | —                       | 0.49          | 618-662                |
| 351-375                | —                       | 0.42          | 663-707                |
| 376-400                | —                       | 0.34          | 708-752                |

5. Safe operation of heaters equipped with NEMA 4 and NEMA 7 terminal housings depends on electrical wiring meeting the national electrical code for these locations and limiting maximum operation temperatures. Approved pressure and/or temperatures limiting controls must be used to assure safe operation in the event of system malfunctions.
6. An integral thermostat functions as a temperature control only and is not a fail-safe device. An approved pressure and/or temperature limit control should be used in the event of system malfunctions.
7. Never perform any type of service on heaters prior to disconnecting all electrical power.



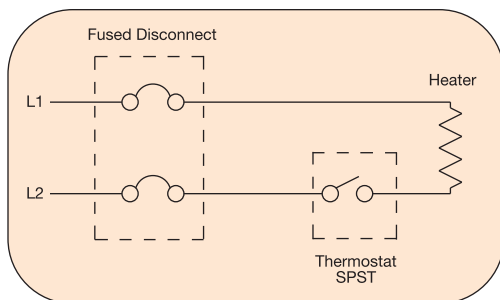
All wiring should be done in accordance with the National Electrical Code and applicable local codes.

### Wiring Diagrams

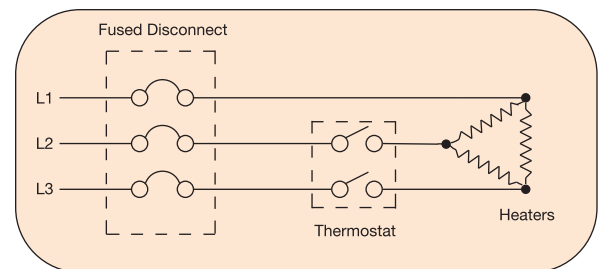


For current in 3 phase circuits:  $I = \frac{W}{1.73E}$

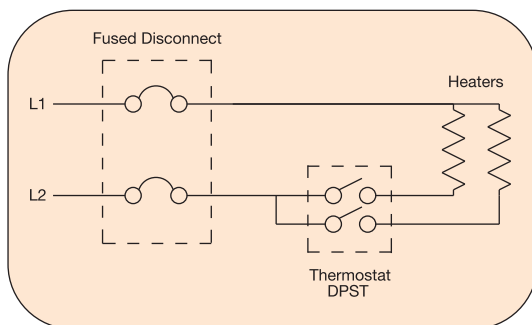
**Note:** If elements are designed for 3-phase delta connection wattage output may be reduced to 1/3 by rewiring to 3-phase WYE.



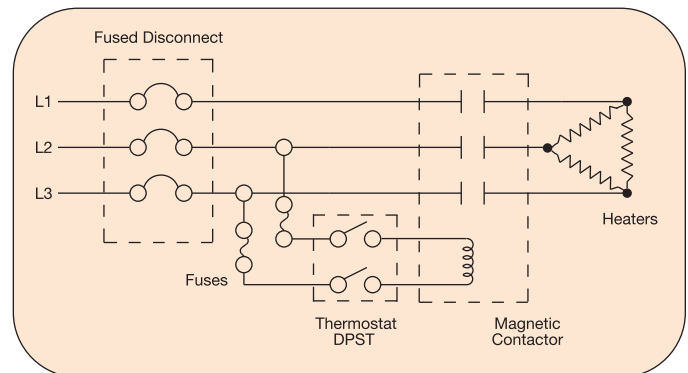
Single-phase circuit with SPST thermostat.



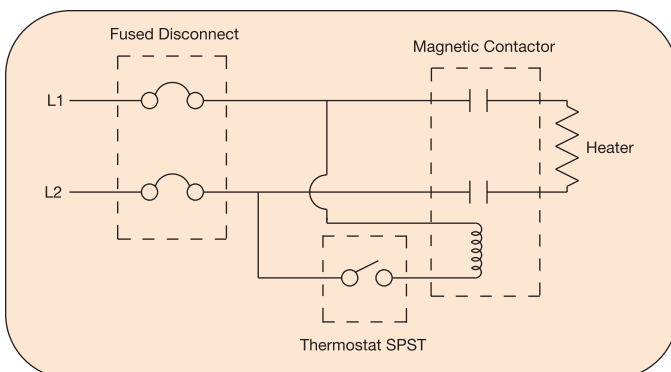
Three-phase circuit with DPST thermostat.



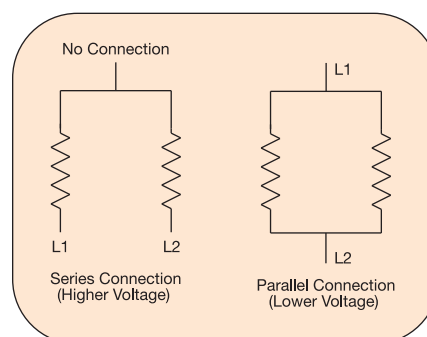
Single-phase circuit with thermostat connected for half current load across each contact.



Three-phase circuit when line current exceeds thermostat rating.



Single-phase circuit when line current exceeds thermostat rating.



### Dual Voltage

Example: Two 120V heaters wired in parallel for 120V operation or wired in series for 240V operation.

**NOTE:** To reduce wattage in a system, two heaters rated at 240 volts wired in series to a 240 volt power supply will generate 1/4 of their rated wattage.