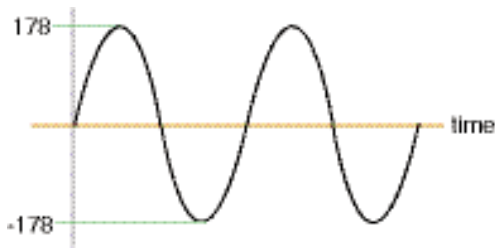


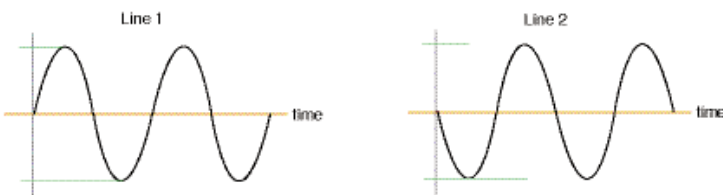
## Introduction

Electric power distribution to homes and businesses is in the form of alternating voltage and current at a frequency of 60 cycles per second, or 60 Hertz (HZ). The AC line voltage swings from plus to minus while the neutral line stays at zero volts. When you measure the voltage from the AC line to the neutral, using a voltmeter, you are measuring the Root Mean Square or RMS value which is the voltage that is available to power equipment.



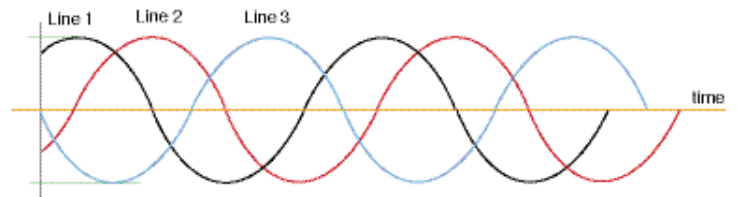
## 120/240 VAC Single Phase

Most homes receive single phase power from the utility company. The utility company provides a 120 VAC RMS line and a matching opposite line which is 180 degrees shifted from the first line. If you measure the voltage across the 2 incoming lines, they will measure 240 VAC and provide twice the power of a single 120 VAC line



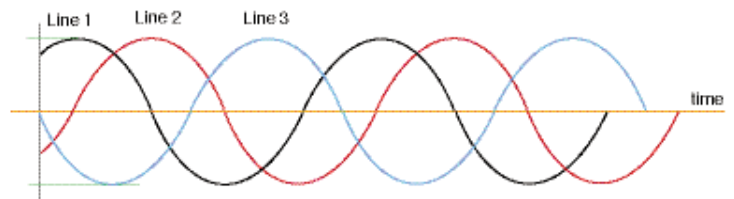
## 208 VAC Three Phase

Many businesses have 208 three phase power. This consists of three 120 VAC lines with each line spaced 120 degrees apart so the power delivered to the equipment is much greater than a single phase system. The overlapping peaks of each 120 VAC line looks like the diagram below. Measuring the voltage between any two 120 VAC lines will read 208 VAC on the voltmeter.



## 480 VAC Three Phase

Industrial businesses and hotels/motels very often have 480 VAC, three phase power. This consists of three 277 VAC lines with each line spaced 120 degrees apart. This power is used for large motors and commercial A/C. Very often hotels and motels take each 277 VAC phase and direct it to one floor of the building. Measuring the voltage between any two 277 VAC phases will read 480 VAC on the voltmeter.



## Three Phase Electrical Circuit Wiring and Color Codes

Three phases wiring may or may not include a Neutral wire. In situations where both individual phases are distributed to different areas the Neutral will be included with the electrical distribution. If three phase power is used strictly for high power equipment such as three phase motors or compressors the Neutral wire will not be used. Each phase of a three phase circuit uses a different color wire for identification and traceability back to the circuit breaker panel box:

Description	Line 1	Line 2	Line 3	Neutral	Earth Ground
Older Wiring & 120/208 VAC	Black	Red	Blue	White	Green
Newer 277/480 VAC Wiring	Brown	Orange	Yellow	White	Green