AE9-1228 R4 **COPELAND NAMEPLATE VOLTAGES** **March, 2004**

Since the growth of the electrical power industry in the United States has been relatively free of any national standards or controls, a wide variety of 60 cycle power systems have been developed. In a like manner, electric motors designed to operate on those systems have been developed to varying standards.

As demands on the available power supply have grown, equipment designers must take into account the fact that variations in supply line voltage are not only possible but probable, and the dependability of service of any electric motor is directly related to its ability to operate not only at its nominal voltage, but at the extremes, both high and low, that it may encounter.

The voltage extremes at which a compressor will operate depend on the operating load imposed on the compressor. Copeland compressors are developed to operate at established maximum load conditions at the extremes of the voltage range, and at light load conditions will operate quite satisfactorily in some cases beyond the established voltage limits.

Because of the variation in supply voltages which are encountered, motors developed for most Copeland compressors are designed to operate over an extended voltage range rather than for a single service voltage. The heavy duty extended voltage motor is somewhat more costly, but the advantages of easy production scheduling, reduction in finished goods inventory, and ready service availability have been proven by experience. Few, if any, operating problems have been encountered with the extended voltage motors even at extremely low line voltage conditions.

The majority of motors used in air conditioning and refrigeration equipment for 208 volt and 240 volt distribution systems are extended voltage 208/230 volt motors. 208/230 volt single-phase motors are generally limited to operation at 197 volts under Copeland's maximum design load conditions for compressors, while 208/230 volt three-phase motors are generally limited to 187 volts under similar maximum load conditions. At times, engineers who are primarily familiar with NEMA rated single voltage motors jump to the conclusion that a 200 volt nameplate is a better motor for low voltage conditions. Such a conclusion is not necessarily true. Since Copeland maximum design load standards for compressors are quite conservative, compressors operating at normal load conditions found in systems are capable of operation at voltages far below the normal tolerance of minus 10% of the nameplate. Field experience further supports the conclusion that the extended voltage motor, because of its stronger winding construction, is capable of operating far below normal voltage conditions for extended periods without adverse effects.

Standardized Copeland nameplate voltage ratings for 60 cycle power are shown in Table 1.

The nameplate ratings apply to both compressors and Copeland condensing units.

Other voltages available are shown in Table 2 and 3. Not all models are available in the listed voltages. Please refer to www.copeland-corp.com for specific model availability.

The operating voltage range listed is for Copeland's maximum load design conditions for compressors. These conditions are normally more severe than those experienced by compressors operating in systems at system maximum load conditions. More specifically, compressors which meet these standards will normally operate satisfactorily at the system conditions and voltages required by ARI Standard 110.

TABLE 1
60 HZ COPELAND NAMEPLATE VOLTAGE STANDARDS

Nameplate Voltage 60 Hertz	Operating Voltage Range at Copeland Maximum Load Design Conditions for Compressors
100 - 1	90 - 110
115 - 1	103 - 127
200 - 1	180 - 220
208 - 1	187 - 229
230 - 1	207 - 253
208/230 - 1	187-253 semi-hermetic and scroll
208/230 - 1	197 - 253 hermetic (welded)
265 - 1	238 - 292
208/230 - 3	187 -253
380 - 3	342 - 418
460 - 3	414 -506
575 - 3	517 - 633
200/230 - 3	180 - 253
All Other Voltages and Frequencies	±10% of Nameplate

TABLE 2

Voltage Code	Voltage Ranges 50 Hertz Rating	60 Hertz Rating
A	100	115 - 1
B	200-1	230 - 1
C*	200/220 - 3	208/230 - 3
D	380/420 - 3	460 - 3
E	500 - 3	575 - 3
F	115 - 1	-
G	230 - 1	-
H	200-1	208-1
I	208/230-1	-
J	220/240 - 1	265 - 1
K	200/380/400 - 3	208/230/460 - 3
L	210/240/380 - 3	-
M	380/420 - 3	-
N	200/400 - 3	230/460-3
P	200/380 - 3	-
R	220/240 - 3	-
S	220 - 1	-
U	-	200 - 3
V*	200 - 1	208/230 - 1
X	-	220/380 - 3
Z	220/240 - 1	-
5*	200/220 - 3	200/230 - 3
7	-	380 - 3
8	-	200/220/380 - 3
*Miscellaneous Voltage Ranges See Table 3		

TABLE 3

Voltage Code	*Miscellaneous Voltage Ranges 50 Hertz	60 Hertz
	Coplematic	
V	200/220 - 1	208/230 - 1
	CR	
5	220/240 - 3	-
	Scroll	
C	200 - 3	-