ENCLOSURE HEATING AND HEATER SELECTION

Why Do Enclosures Need Heat?

Heat is required to raise the temperature of the control panel, for freeze protection, reduce humidity, and prevent damage to the electronic components. As the complexity of electronics increase the temperatures in the panel increase, and it becomes even more critical to safeguard the enclosures. As a result of the higher temperatures, cooling systems are often required in many applications. When you have both the heat build-up and cooling moisture forms which causes the components to fail whether the enclosure is indoors or outdoors, insulated or un-insulated.

Moisture and Failure

When moisture is combined with contaminants, such as gas, dirt, water or dust, it may cause atmospheric corrosion, and failure of the components such as relays, transformers, bus bar, and integrated circuit boards. The most dangerous conditions are outdoors with large variation in ambient temperatures. Failure modes include; resistance changes, creepage current, insulation properties being compromised and flashovers.

Eliminate Moisture

It is important to keep the relative air humidity below 60% to minimize moisture and corrosion. Should the relative air humidity rise above 65% it greatly increases the opportunity for moisture and corrosion problems to occur. Keeping the enclosure temperature 10°F higher than the ambient air temperature prevents moisture and corrosion in the enclosure. Consistent temperatures assure peak operating conditions. Continual changes in the enclosure temperatures produce condensation and decrease the life expectancy of the components

Heater Location

Mounting the heaters along with a thermostat near the bottom of the enclosure provides the best performance. Thermostats can be an integral part of the heater or purchased as an accessory item. The controller should be positioned in a neutral location that will provide an average humidity or temperature reading. Placing the thermostat too close to the heater may provide a reading that is influenced by the direct heat off of the heater.

		Temperature Rise from Minimum Expected Ambient Temperature to Desired Enclosure Temperature (°F)													
		20		40		60		80		100		120		140	
Enclosure Surface Area – Square Feet	50	935	402	1800	774	2740	1178	3600	1548	4600	1978	5475	2354	6340	2726
	40	750	323	1430	615	2200	946	2875	1236	3700	1591	4400	1892	5065	2178
	30	560	241	1100	473	1650	710	2175	935	2760	1187	3285	1413	3795	1632
	25	470	202	900	387	1370	589	1800	774	2300	989	2735	1176	3170	1363
	20	375	161	725	312	1100	473	1450	624	1840	791	2200	946	2525	1086
	15	280	120	540	232	820	353	1075	462	1375	591	1650	710	1900	817
	10	185	80	360	155	550	237	725	312	920	396	1100	473	1265	544
	9	165	71	315	135	480	206	635	273	805	346	960	413	1110	477
	7.5	140	60	270	116	410	176	540	232	690	297	825	355	950	409
	6	112	48	216	93	325		450	194	550	237	660	284	770	331
	5	95	41	180	77	275	118	365	157	460	198	550	237	635	273
	4	74	32	142	61	216	93	290	125	370	159	440	189	500	215
	3	55	24	110	47	165	71	220	95	275	118	330	142	385	166
	2	37	16	75	32	109	47	145	62	185	80	220	95	250	108
		Required wattage – Double above values in areas with extreme wind factors.													
		uninsulated cabinet insulated cabinet													