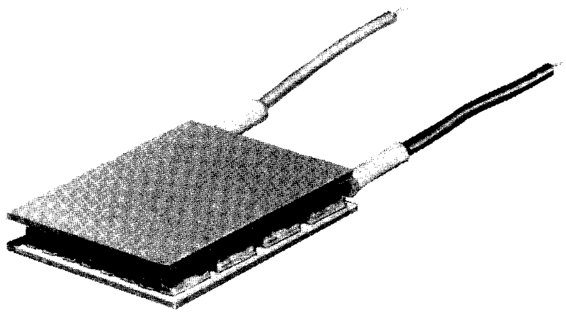
Single Stage ThermoElectric Modules

Rating: 0-235 BTU/ HR Cooling

Features:

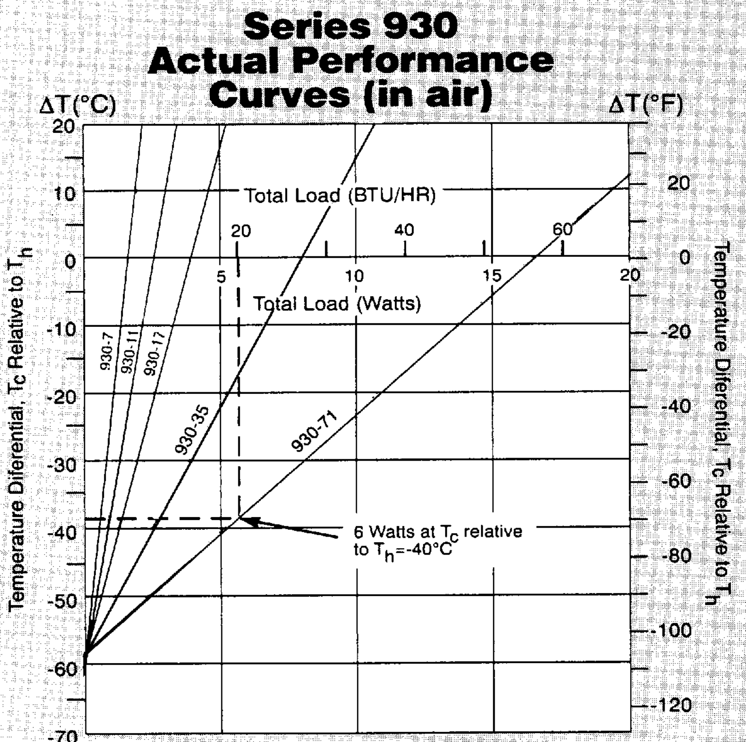
- Operates in -150°C (-238°F) to 80°C (+176°F) Temperature Range
- No vibration, noise
- Operates in any orientation, horizontal, vertical, etc.
- Can operate in cooling or heating mode
- No moving parts, compressor, or piping required.
- No load cooling to -41°C (-42°F) With Hot side at +25°C (+77°F)



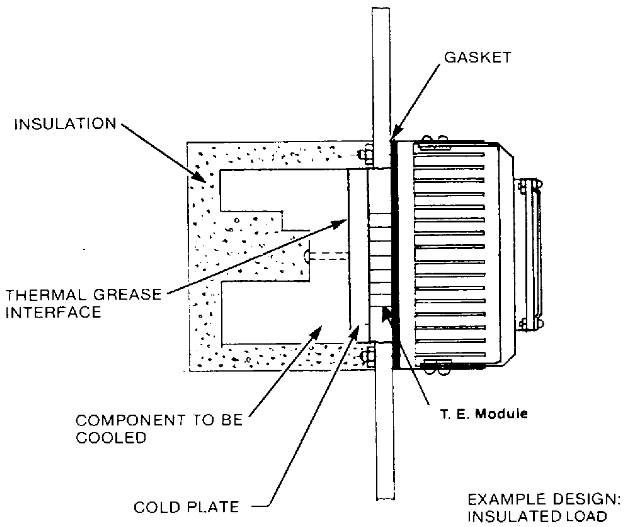
Solid state thermoelectric modules are a silent, compact, and reliable method of heat removal. Applications, ranging from missile guidance systems to portable refrigerators, are only limited by the imagination of the designer. System simplicity assures ease of adapting to thermoelectric heat pumping. Thermoelectrics have no compressor or piping, eliminating compressor maintenance and coolant leakage. Modules can be converted from cooling to heating by a reversal of polarity from the power input.

teca

ThermoElectric Cooling America Corporation



Temperature differentials are relative to 27°C (80°F) hot side temperature (Th).
Note: As hot side temperature rises to 50°C (122°F) temperature differential and load capacity will improve by approximately 10%. For improved efficiency and smaller heat sink dimensions the performance curves shown have been operated at 75% of the maximum rated current and voltage.



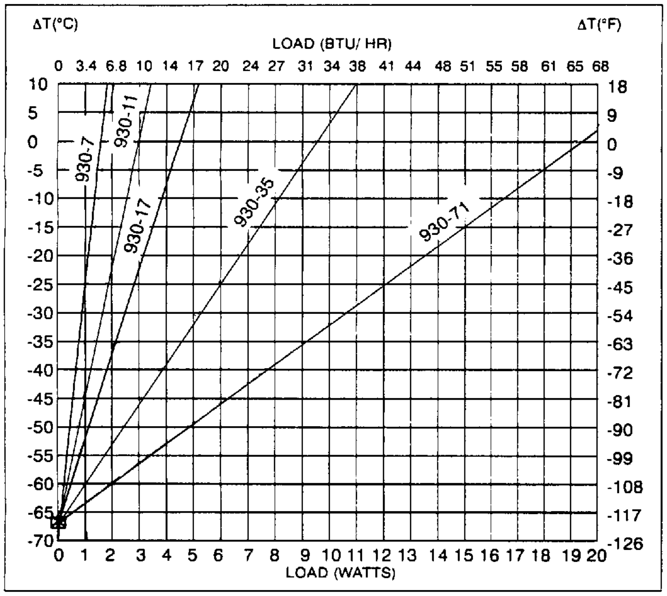
4 Easy Steps To Design Of ThermoElectrics

1. The designer must know three essential values; required cooling temperature of the load, ambient temperature and useful thermal load.
2. Determine actual requirements of TE module. Find the TE module cold side temperature (Tc), hot side temperature (Th), and heat pumped by TE module (Q). Note that a temperature difference (Th-Tc) in excess of 50°C generally requires a multi-stage design.
3. Select a TE module which operates in the current range you are willing to supply and supplies the heat pumping at the required temperature differential. (Single stage module specification chart, pg 46, 47)
4. With the module type, find module voltage and calculate electrical input power and hot side output to determine power supply and heat sink requirements.

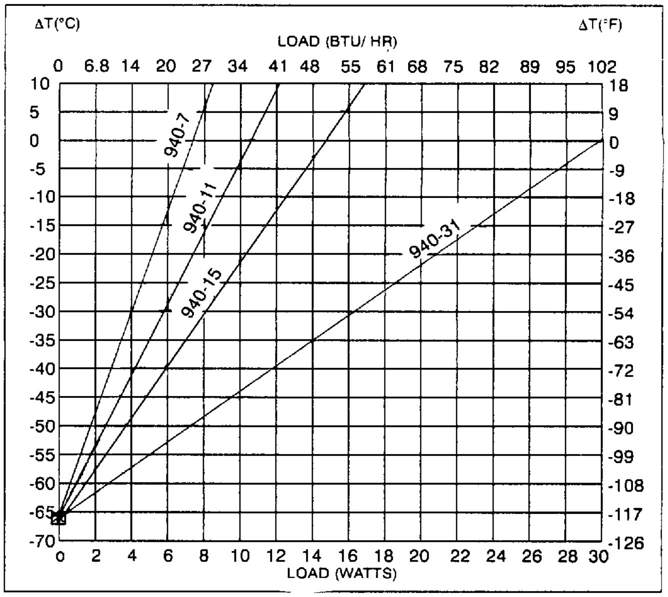
Example

1. Assume the load temperature is +5°C (+41°F), ambient air temperature is +25°C (+77°F) and useful load is 4 watts (14 BTU/hr).
2. In this practical case with well designed heat transfer and isolation, expect a 5°C temperature drop on the cold side to the load and a 15°C rise on the hot side to ambient with a forced convection heat exchanger. Leakage losses should not exceed 10% of the load. Thus, you have a 0°C (+32°F) cold side, +40°C (+104°F) hot side and 4.4 watt (15 BTU/hr) module load.
3. A single stage 930-35 module operating at Th = 40°C was found to provide 3.5 watts (12 BTU/hr) of cooling. This unit is undersized. A 930-71 module operating at Th = 40°C provides 6 watts (20 BTU/hr) cooling. This module has amble capacity. (See curve on left.)
4. Module voltage is 6 volts, current is 2.8 amps. The heat load of the hot side heat exchanger is 4.4 watts, +6 volts x 2.8 amps = 21 watts.

930 Series



940 Series

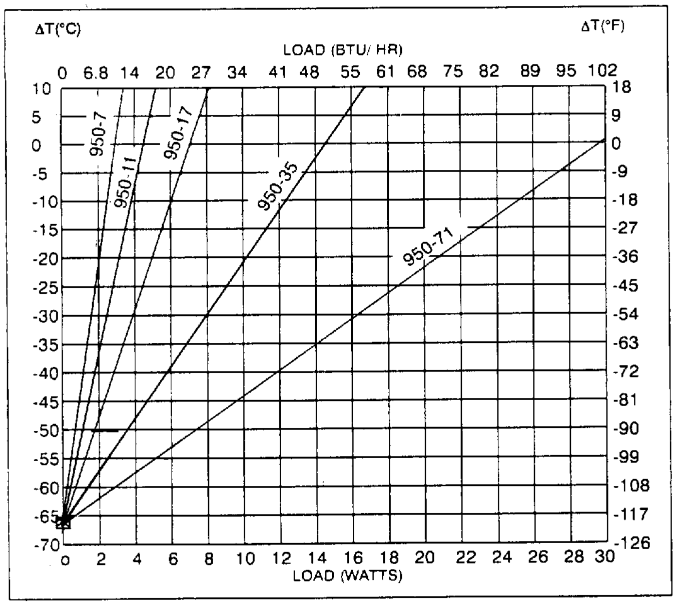


Temperature differentials relative to+27°C (80°F) hot side temperature (Th).

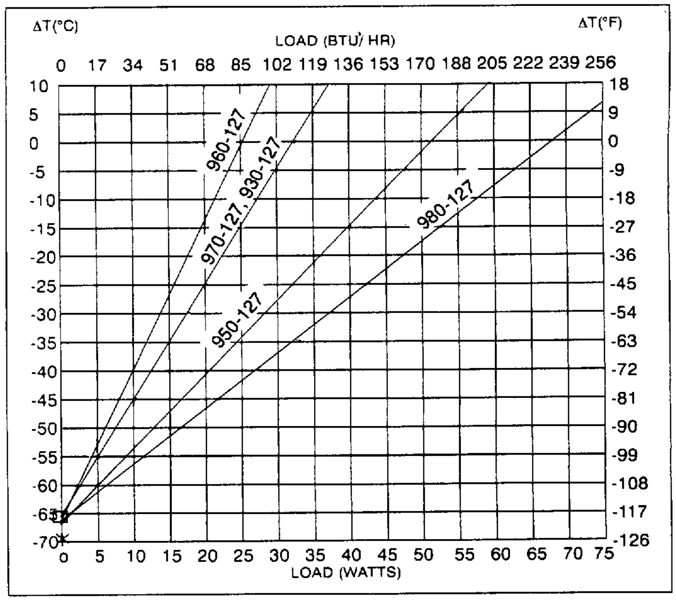
Single Stage Module Specification Chart

Module	Performance								
	Th=27°C			Th=35°C			Th=50°C		
Series/ Couples	MaxΔT @Q_C=0 (ΔT°C)	Max Q_C @ΔT=0 (Q_C watts)	Equation of Line	MaxΔT @Q_C=0 (ΔT°C)	Max Q_C @ΔT=0 (Q_C watts)	Equation of Line	MaxΔT @Q_C=0 (ΔT°C)	Max Q_C @ΔT=0 (Q_C watts)	Equation of Line
930-7	66	1.8	ΔT=36.7Qc-66	73.6	1.9	ΔT=38.7Qc-73.6	78.1	2.0	ΔT=39.1Qc-78.1
930-11	66	2.9	ΔT=22.76Qc-66	73.6	3.1	ΔT=23.7Qc-73.6	78.1	3.2	ΔT=24.4Qc-78.1
930-17	66	4.5	ΔT=14.67Qc-66	73.6	4.7	ΔT=15.7Qc-73.6	78.1	5.0	ΔT=15.6Qc-78.1
930-35	66	9.4	ΔT=7.02Qc-66	73.6	9.9	ΔT=7.43Qc-73.6	78.1	10.4	ΔT=7.51Qc-78.1
930-71	66	19.0	ΔT=3.7Qc-66	73.6	20.0	ΔT=3.65Qc-73.6	78.1	21.0	ΔT=3.68Qc-78.1
940-7	66	6.8	ΔT=9.70Qc-66	70.0	7.0	ΔT=10Qc-70	75.4	7.5	ΔT=10.1Qc-75.4
940-11	66	10.6	ΔT=6.23Qc-66	70.0	11.0	ΔT=6.4Qc-70	75.4	11.7	ΔT=6.4Qc-75.4
940-15	66	14.5	ΔT=4.55Qc-66	70.0	15.0	ΔT=4.67Qc-70	75.4	16.0	ΔT=4.71Qc-75.4
940-31	66	30.0	ΔT=2.23Qc-66	70.0	31.0	ΔT=2.25Qc-70	75.4	33.0	ΔT=2.27Qc-75.4
950-7	66	3.0	ΔT=22Qc-66	70.0	3.1	ΔT=2.2Qc-70	75.0	3.3	ΔT=22.7Qc-75
950-11	66	4.6	ΔT=14.35Qc-66	70.0	4.8	ΔT=14.6Qc-70	75.0	5.1	ΔT=14.7Qc-75
950-17	66	7.2	ΔT=9.17Qc-66	70.0	7.4	ΔT=9.46Qc-70	75.0	7.9	ΔT=9.50Qc-75
950-35	66	14.8	ΔT=4.46Qc-66	70.0	15.3	ΔT=4.58Qc-70	75.0	16.3	ΔT=4.60Qc-75
950-71	66	30.0	ΔT=2.3Qc-66	70.0	31.0	ΔT=2.26Qc-70	75.0	33.0	ΔT=2.23Qc-75
930-127	70	33.4	ΔT=2.10Qc-70	75.0	38.1	ΔT=1.97Qc-75	80.0	38.6	ΔT=2.07Qc-80
950-127	66	51.4	ΔT=1.28Qc-66	71.0	54.4	ΔT=1.30Qc-71	74.4	60.0	ΔT=1.24Qc-74.4
960-127	66	26.0	ΔT=2.54Qc-66	75.0	29.4	ΔT=2.55Qc-75	80.0	30.0	ΔT=2.67Qc-80
970-127	66	33.4	ΔT=1.98Qc-66	75.0	37.8	ΔT=1.98Qc-75	80.0	38.6	ΔT=2.07Qc-80
980-127	65	68.8	ΔT=.94Qc-65	72.2	83.2	ΔT=.87Qc-72.2	77.2	84.9	ΔT=.91Qc-77.2

950 Series

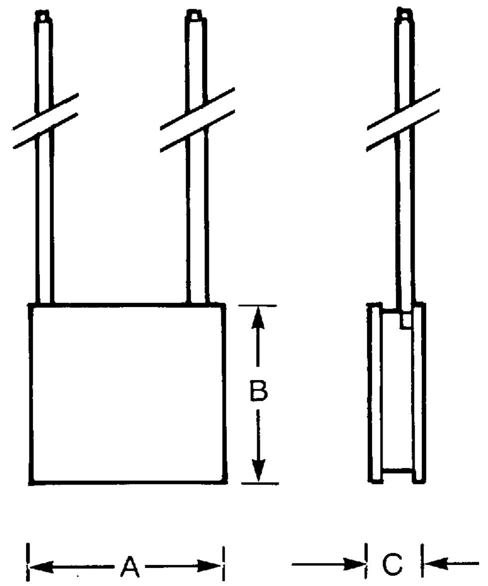


127 Couple Modules

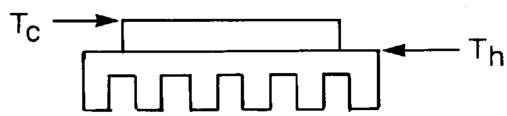


Temperature differentials relative to+27°C (80°F) hot side temperature.

Module Series/ Couples	Electrical			Dimensons		
	Max Current (amps)	Max DC Voltage (volts)	Nominal Resistance (Ω)	A in(cm)	B in (cm)	C in (cm)
930-7	3.7	0.8	0.22	0.38 (.965)	0.38 (.97)	0.19 (.48)
930-11	3.7	1.2	0.32	0.38 (.965)	0.57 (1.46)	0.19 (.48)
930-17	3.7	1.9	0.49	0.57 (1.46)	0.57 (1.46)	0.19 (.48)
930-35	3.7	3.9	0.93	0.57 (1.46)	1.20 (3.05)	0.19 (.48)
930-71	3.7	8.0	2.00	1.2 (3.05)	1.2 (3.05)	0.19 (.48)
940-7	14.0	0.8	0.06	0.57 (1.46)	0.57 (1.46)	0.18 (.45)
940-11	14.0	1.2	0.08	0.57 (1.46)	0.85 (2.16)	0.18 (.46)
940-15	14.0	1.7	0.11	0.57 (1.46)	1.20 (3.05)	0.18 (.46)
940-31	14.0	3.5	0.20	1.2 (3.05	1.2 (3.05)	0.18 (.46)
950-7	6.0	0.8	0.15	0.38 (.97)	0.38 (.97)	0.15 (.38)
950-11	6.0	1.2	0.18	0.38 (.97)	0.57 (1.46)	0.15 (.38)
950-17	6.0	1.9	0.29	0.57 (1.46)	0.57 (1.46)	0.15 (.38)
950-35	6.0	3.9	0.61	0.57 (1.46)	1.20 (3.05)	0.15 (.38)
950-71	6.0	8.0	1.20	1.2 (3.05)	1.2 (3.05)	0.15 (.38)
930-127	3.9	15.4	3.24	1.57 (3.99)	1.57 (3.99)	0.185 (.47)
950-127	6.0	15.4	2.11	1.57 (3.99)	1.57 (3.99)	0.15 (.38)
960-127	3.0	15.4	4.08	1.18 (3.00)	1.18 (3.00)	0.142 (.36)
970-127	3.9	15.4	3.14	1.18 (3.00)	1.18 (3.00)	0.126 (.32)
980-127	8.5	15.4	1.49	1.57 (3.99)	1.57 (3.99)	0.130 (.33)



NOTE: For improved efficiency and smaller heat sink dimensions, operate T.E. modules at 75% of the maximum rated current and voltage.



For Equations:
Max ΔT=temperature differential (T_C-T_h) (°C)
Max Q_C=heat pumped by module (watts)