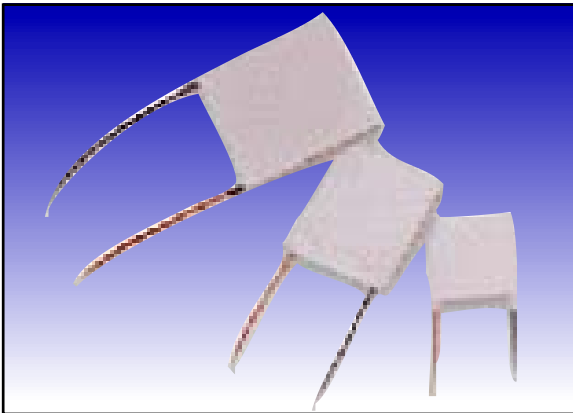


# Thermoelectric Heating & Cooling Components



## Features

- Heat and Cool – temperature control above and below ambient
- Up to 67°C difference between faces
- Multi-staging for wider temperature ranges
- Low voltage
- Exceptional control stability
- Compact – ideal for localized heating and cooling
- Single elements up to 1000 watts

Thermoelectric coolers (TEC) are solid state heat pumps that utilise the peltier effect for reversible heating or cooling. HAWCO's range of elements are available in standard dimensions and power ratings as well as in custom designed configurations for OEM applications. The TEC's control temperature by pumping heat from one surface of the component to the other depending on the polarity of the electrical supply.

### STANDARD "IN STOCK" MODELS

ProductCode	Qc(W)	DeltaT(C)	I(A)	Vdt	Length(mm)	Width(mm)	Height(mm)
<b>Section Area of SemiConductor 2.0mm x 2.0mm</b>							
TEC1-12709	76.8	67	9.0	15.4	50	50	5.6
TEC1-7109	43	67	9.0	8.6	44	44	5.6
TEC1-7114	67	67	14	8.6	44	44	4.6

W = Wattage (Power)

DeltaT = Max Temp Difference  
Between Both Sides

### Section Area of SemiConductor 1.4mm x 1.4mm

TEC1-12703	29.3	67	3.3	14.5	40	40	4.7
TEC1-12706	51.4	67	6.0	15.4	40	40	4.0
TEC1-12708	68.8	67	8.5	15.4	40	40	3.3
TEC1-7103	16.4	67	3.3	8.1	30	30	4.7
TEC1-7106	28.7	67	6.0	8.6	30	30	3.8
TEC1-7108	38.5	67	8.5	8.6	30	30	3.3
TEC1-4903	11.3	65	3.3	5.6	25	25	4.7
TEC1-4906	15.8	65	6.0	5.8	25	25	3.8
TEC1-4908	22.8	65	8.5	5.8	25	25	3.3

A = Amps (Max Current)

Vdt = DC Voltage Required

### Section Area of Semiconductor 1.0mm x 1.0mm

TES1-12703	25.7	65	3.3	14.5	30	30	3.6
TES1-12704	33.4	65	3.9	15.4	30	30	3.3
TES-7103	14.4	63	3.0	8.6	23	23	3.6
TES-7104	18.7	63	3.9	8.6	23	23	3.2
TES1-6303	12.7	63	3.0	7.6	15	30	3.6
TES1-6304	16.6	63	3.9	7.6	15	30	3.2

# Thermoelectric Heating & Cooling Components

## THERMOELECTRIC POWER CONTROLLERS

### THERMOELECTRIC COOLERS & HEATERS

Hawco's Thermoelectric (TEC) power controllers can be connected directly to almost any temperature control device. The unit provides smooth DC, variable current control providing up to 30 volts and 10 amps. Multiple series elements can be used to achieve up to 300 watts of cooling. Just select the current rating required and transformer capable of supplying the TEC voltage and current.

#### Features

- **Current Control**
- **10 Amp and 6 Amp ratings**
- **30V maximum operating output**
- **Connects to most Controllers/Thermostats**
- **DC voltage 4-20 mA, contact, potentiometer or logic inputs**
- **Damped output for pulsed, on/off demand signals**
- **Simple repeatable current setting**
- **Thermal protection of power circuit**
- **Simple mounting to chassis/heatsink**

#### Specifications

##### Transformer

Supply	230VAC
Output	6 Amp version – 126VA, 14 VAC, 9A Max TEC Power 90W 10 Amp version – 360VA, 24 VAC, 15A Max TEC Power 300W

##### Control Board

Supply Voltage	9 to 24VAC or 9 to 35VDC
Output	Variable current, limited by DIL 15 position switch Max 5 or 10 amps 30VDC depending on model and transformer
Control Input	4-20 mA, 0-5VDC, non isolated 5 to 15VDC logic, isolated volt-free contact input
Control Action	Variable current proportional to 4-20mA/0.5V Logic/contact – damped variable current
Power Status	Power ON led
Connections	Plug in screw terminals
Housing	Non PCB only. Heatsink bracket to be attached to suitable heat sinking device, i.e. chassis
Environmental	Max ambient temp 40°C 15-90% RH non condensing
Safety	Over temperature protection 70°C PCB mounted fuse
Dimensions	180mm x 90mm x 80mm high

TEC devices need careful selection to meet design requirements and to be reliable. Both faces must be attached to a heat-sinking device, which must efficiently transfer the heat from the surfaces of the TEC without the temperature between the surfaces exceeding its Delta T rating. Further extremes of temperature can be achieved by "piggybacking" units thus keeping inside the Delta T rating. Power regulation is equally important. All Hawco TEC power controllers provide variable current regulation, reducing thermal shock, experienced when the units are pulsed on/off, which can reduce life expectancy. A full technical installation data-sheet is available on request.

# Thermoelectric Heating & Cooling Components

## Thermoelectric Wattage Calculation Guide

$$\text{Wattage} = \frac{2 \times \text{material weight (Kg)} \times \text{Specific Heat} \times \text{Temp Change (}^\circ\text{C)}}{3,142 \times \text{Time (Hours) to get to required temperature}}$$

**NOTE** Item to be temperature controlled is the material weight. Heat and efficiency losses have been assumed at 100%.

### Heat Sink Selection

The heatsink's purpose is to keep the non-temperature critical surface as close to ambient temperature as possible. The more efficiently this is done the greater thermal range of the controlled side.  
THERMOELECTRIC COOLERS & HEATERS

The maximum temperature difference between the two surfaces is the Delta T ( $^\circ\text{C}$ ) rating.

To calculate the minimum size of the heatsink needed on the non-temperature controlled hot side, use the following formulae.

If possible use the most efficient heatsink possible. This will reduce stress on the TEC and extend life.

Step 1) Calculate the max temperature of the heatsink on the non-critical side.  
Target Temperature on cooled controlled side + Delta T = Max temp heatsink  
Example:  $-20^\circ\text{C}$  target temp +  $67^\circ\text{C}$  Delta T =  $47^\circ\text{C}$  Max Temp

Step 2) Calculate the heatsink capacity required in  $^\circ\text{C/Watt}$  (Heatsink temperature rise per watt)

A) Max temp heatsink – Ambient Temperature = Max temp rise of heatsink  
Example:  $47^\circ\text{C} - +20^\circ\text{C} = 27^\circ\text{C}$  Max temp rise  
When  $20^\circ\text{C}$  is the ambient temperature

B) TEC Wattage  $\times 0.75 = ^\circ\text{C}$  Per Watt heatsink  
Max Temp Rise  $^\circ\text{C}$

Example 76.8 Watts  $\times 0.75 = 2.13 \text{ Watt}/^\circ\text{C}$  Heatsink Rating  
 $27^\circ\text{C}$

**Note:** Fan cooling will increase heatsink efficiency. Custom, pre-assembled heatsink thermoelectric combinations available on request.

**FAX BACK NOW: 01483 883888**

To Simon Dugdale

I am interested in these high quality, excellently priced Thermoelectric elements and power controllers.

I am interested in model .....

Please ask a sales engineer to contact me .....

Name ..... Job Title .....

Company .....

Address .....

..... Town .....

County ..... Postcode .....

Tel ..... Fax .....

Email .....