

INDUSTRIAL “HOW TO INSTALL” SERIES THERMOELECTRIC COOLING

Introduction

The wide and varied nature of applications where VESDA Industrial ASD systems can be employed sometimes presents situations where the only option for the detector is that of locating it in an environment that is close to, or outside the operating temperature range of the detector.

These situations present concerns for many designers and typically ASD is subsequently rejected in preference to other forms of technology. In other situations and without proper consultation detectors are located in unsuitable housings or inappropriate locations that can potentially cause ongoing performance issues and maintenance.

There is however, a way in which VESDA detectors can be installed and still perform within their operating parameters if housed correctly.

Peltier Thermoelectric Cooling

Thermoelectric technology (the Peltier effect) can be used to cool industrial enclosures and provides a number of significant advantages in certain applications. Discovered nearly two centuries ago, today modern technological advances with thermoelectric coolers drastically improve both effectiveness and efficiency.

Very simply, thermoelectric cooling uses an electrical current passed through semiconductors to facilitate temperature change – cooling enclosures to temperatures below or near ambient conditions (Refer to Figure 1 and 2 below).

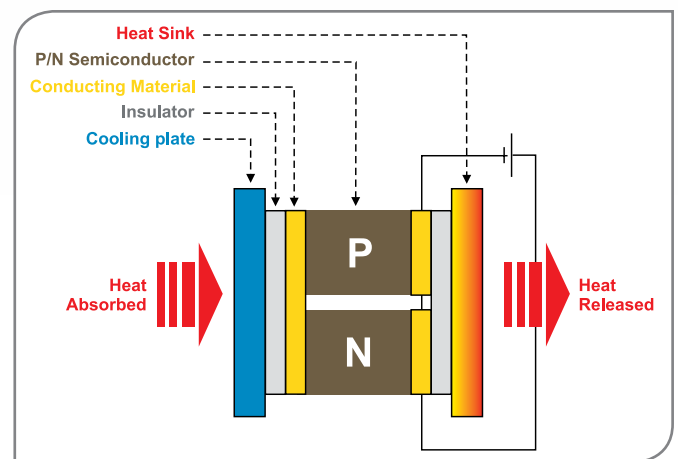


Figure 1

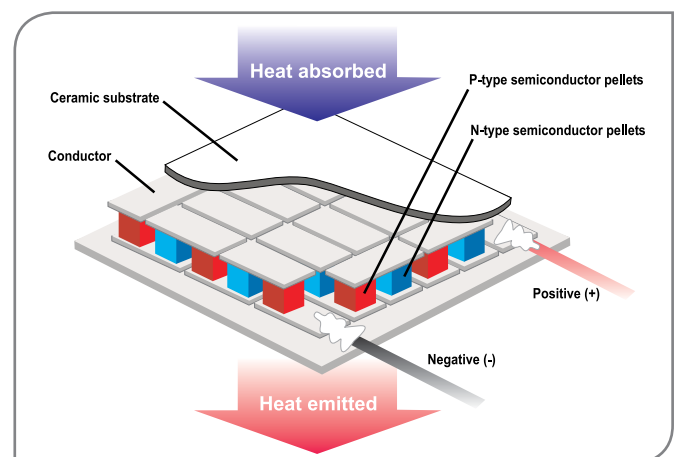


Figure 2

Peltier devices are commonly used in camping, portable coolers, cooling electronic components and small instruments. Some electronic equipment intended for military use in the field is thermoelectrically cooled. A camping/car type electric cooler can typically reduce the temperature by up to 20°C below the ambient. (Refer to Figure 3).

Simple single plate cooling devices combined with a heat sync as shown (refer to Figure 4) are available and are relatively inexpensive, suitable for small enclosure cooling. More complex units incorporating small fans have greater cooling capacity and ideal for larger enclosures. (Refer to Figure 5).

The final choice and model type of the Peltier device selected needs to be considered relative to the application situation. There are many manufacturers and suppliers of these devices globally so procuring suitable units is a simple matter.

Heating

Thermoelectric modules also work as high-efficiency heating elements.

This feature is important if thermal cycling, is required or when seasonal temperature changes require dual functionality.

Note: Applying Thermoelectric Cooling or Heating to enclosures where VESDA equipment is housed requires some technical expertise to ensure the correct device is applied and suitable for the required application.

Xtralis recommends consulting with companies and supplier experienced with this technology to ensure the best solution and device is applied.

Xtralis has successfully provided heat control solutions for VESDA detectors located within enclosures in harsh environments over many years, an example of which is shown in Figure 6.



Figure 3 - Portable car cooler

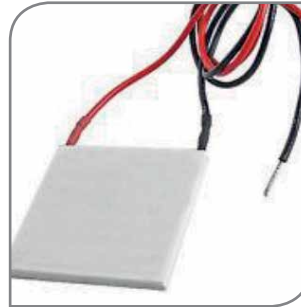


Figure 4 - Standard Plate Module



Figure 5 - Plate module with fan



Figure 6 - Thermoelectric Cooling device providing cooling to externally mounted VESDA detector enclosure

For more information on how your business can benefit from the Xtralis solution for Industrial Applications, please visit www.xtralis.com/industrial or contact your local office or [Authorised Partner](#) for expert advice and assistance with design.