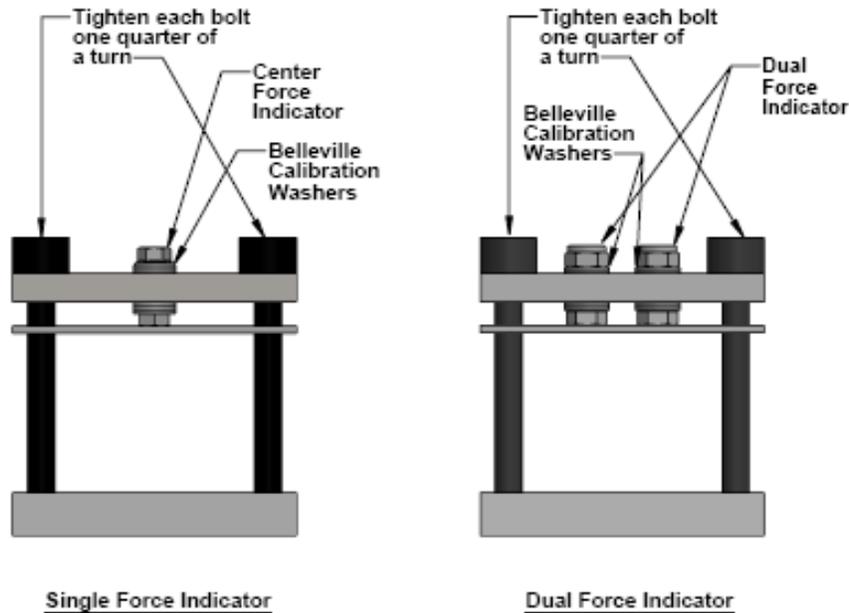




## Press Pack Power Semiconductor Clamps Installation Instructions



Darrah Electric's semiconductor mounting clamp uses a two bolt system with a pre-calibrated center force indicator. The correct force is achieved when the belleville washers located under the center force indicators are free to spin. Lighter clamp force requires only a single force indicator, higher clamp forces require dual indicators. These pre calibrated force indicators eliminate any need for special gauges or torque wrenches.

Each Darrah clamp is labeled with calibrated mounting force. For closer accuracy, clamps are typically calibrated in kilo Newtons (kN). Conversion factor for pounds to kilo Newtons (kN) and vice versa is:

$$\begin{aligned} \text{POUNDS (LBS)} \times .004448 &= \text{KILO NEWTONS (KN)} \\ \text{KILO NEWTONS (KN)} \times 224.8 &= \text{POUNDS (LBS)} \end{aligned}$$

### **Surface Preparation:**

**Surface flatness** in the device mounting interface area should be .001 inch per inch. Generally, commercial extruded heat sinks require spot facing and cast sinks; rough plates, etc., require additional machining to meet the surface flatness requirements.

**Surface finish** in the device mounting interface area should be equivalent to that of the semiconductor device or 32 microinches maximum for disc and 63 microinches maximum for stud. Finer finishes add undue cost with little or no improvement in the thermal performance.

**Care** should be taken in **handling** devices as well as the heat sinks so as to minimize voids, nicks, deep scratches, and other imperfections in the mounting interface area. While minor scratches are not desirable, you should realize that surface flatness is much more critical than surface finish in achieving a good thermal interface.

**Treated heat sink finishes** should be removed from the device mounting interface area. Black anodizing or paint on heat sinks **must** be removed from the mounting area. In addition, irridite or chromate acid dip finishes must be removed from the mounting area for optimum performance. Nickel and tin-plated finishes are acceptable and even desirable in many applications where corrosion could be a problem.

Mounting interface areas should be **free of all foreign material, oxides, and films**. Since most heat sinks are stored and are not assembled immediately after machining, a cleaning operation is recommended. A satisfactory cleaning technique is to lightly polish the mounting area with a very fine 3M Scotch Brite<sup>®</sup> pad. After polishing, it is recommended that this surface area be cleaned with alcohol.

It is important to use a suitable interface compound or thermally conductive grease between the semiconductor device and its heat sink. One of the brands that Darrah Electric recommends is Alcoa No. 2 EJC - Electrical Joint Compound. A small amount should be evenly applied over the conductive area. Excessive grease can be detrimental to interface thermal resistance.

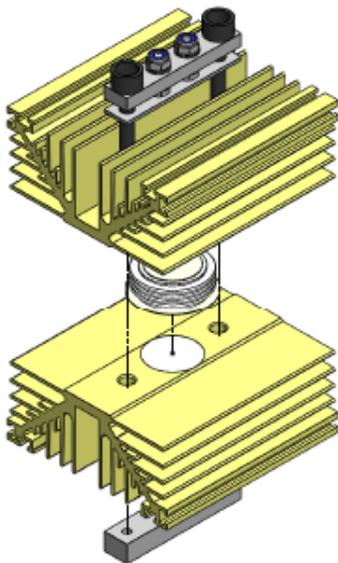
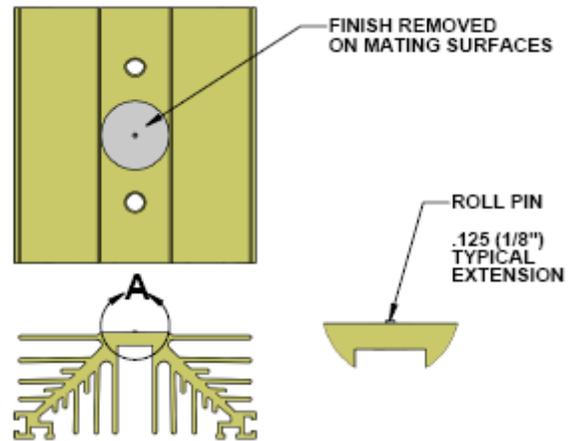
Thermal greases serve two functions. They serve to resist corrosion and secondly they enhance the interface substantially by filling in the voids with a more thermally conductive material than air.

**Installation Instructions:**

In disc devices it is very common to use locating or roll pins to center the device on the heat sink. Pre-assemble roll pins with a light hammer into center dowel hole in each heat sink. A gauge block is useful to prevent excessive pin length. Improperly mounting disc off center or using a locating pin too long and/or wrong diameter, resulting in improper device seating and possible fracturing of the silicon element, are major causes of disc device mounting problems.

After loosely assembling all the components with the disc device between the heatsinks, finger tighten the two nuts on the tie bolts until they just touch their washers. Check that the bar is reasonably parallel with the heat sink, make sure that it is centrally located, and not at an angle to the channel in the heat sink.

Using a socket wrench, alternately tighten each bolt by a quarter turn. After each bolt has been quarter turned, check the center force indicator. Correct force has been applied when the belleville washers are just free to spin.



Clamps with dual force indicators must be tightened evenly. The belleville washers under both indicators must turn freely for correct installation.

Press pack power semiconductors require a recommended mounting force to assure good electrical performance. Manufacturers typically require the force to be within 10% of the recommended force. Using a pre calibrated clamp that is ordered specifically to match the power semiconductor assures good electrical performance.

Semiconductors can be mechanically damaged by too much torque or thermally damaged by too little.

*For additional information, request the following:  
IB 1153 – Selection of Press Pack Power Semiconductor Clamps  
PB 8002 – Power Semiconductor Clamps*