



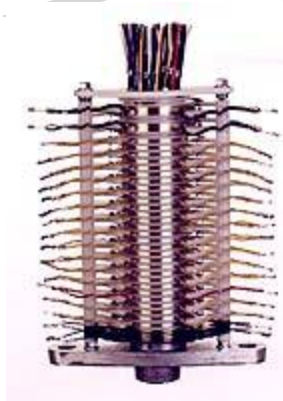
Slip Ring Technologies: Flat Pancake Style vs Stacked Drum Style

Two basic styles of *brush-on-ring* slip rings are currently available from manufacturers internationally, with combinations of the two styles also available. The two styles include the flat or *pancake* style and the stacked *drum* style of assemblies. Each has its advantages and disadvantages.

Pancake Style: Advantages and Disadvantages

The main advantage of the flat style slip ring, which has brushes on concentric rings or contact areas around a center bore, is that it can often be built in a shorter length or height, but usually requires a larger diameter as one possible disadvantage. A second disadvantage of the flat style is that every circuit requires a different diameter of contact surface or ring. To avoid the need for a vast number of different sizes of brass or copper rings, with a variety of wall thicknesses to accommodate different current ratings, many manufacturers of pancake style slip rings have chosen to use copper-plated fiberglass plates to replace both the rings and the insulators.

The circuit board material is etched to remove the material between the rings on the surface and then wire leads are soldered to each ring. This is an inexpensive method of producing a variety of ring widths, but is limited by the thickness of plated copper on the board material, even when augmented with additional plating over the original copper rings or traces. When more than a few amperes are required, either a wider trace is needed or two or more traces with contacting brushes must be paralleled or joined together.



Another disadvantage of the circuit board ring is that when higher voltages, 120-600 Vac, are required, a large spacing is needed over the flat surface between the traces on the board to prevent arcing between circuits. As wider or multiple traces are added for higher amperages and the space between the traces is increased for higher voltage requirements, it soon becomes evident that a limited number of rings can be placed on one board without it becoming extremely large in diameter. The overall diameter is restricted by either the requirements of the application or the physical constraints imposed by the need to keep the circuit board material flat to maintain adequate contact pressure from the brush assemblies contacting the rings. This can lead to the boards being stacked in a manner similar to the drum style of assemblies, except with several circuits on each layer. (Shown here, the drum or stacked design.)

To maintain the advantage of decreased overall height per number of circuits required, the pancake slip ring must use brush contacts with limited travel and of limited length. To help overcome these restrictions, many manufacturers have resorted to a leaf-type spring with contacts directly attached. These often provide a low contact pressure, which makes them more susceptible to loss of contact during vibration or shock.

The other problem with using the spring as the conductor, even if higher contact pressure is initially applied, is the loss of contact pressure that can occur as current is passed through the spring itself. Wear rates on the brush contacts of pancake slip rings are also inherently higher on the outer or larger diameter rings, as the brushes must travel a much longer path for each revolution of the slip ring assembly.