

Subject Differential Compensator



The Differential Compensator is sometimes called a Differential Head, or Diff Head, or Packing Tube. It is a device that allows the Windmill to pump water higher than the outlet of the Rising Column. The Differential Compensator is positioned in the line of the Rising Column and Pump Rod, and it stops the water from being spilling out the top of the Column – ensuring the water is diverted to the horizontal delivery pipeline, and delivered to the tank on a hill, or a long distance away. The Compensator (for a short description) consists of a polished Cylinder, a Rod, and a set of Differential Cups or seals made from either Leather, Nitrile, or Neoprene. These Differential Cups have a hole the size of the Rod and are placed on that Rod; pointing down (towards the pump).

The name is misleading in that it is hard to see how it is either differential or compensating. However a name is a name and it is the function that is important.

The Differential Compensator gained popularity after the 1950's when the problems associated with the old "stuffing box" (or gland packing, or packing box) that required that the gland nut be tightened, frequently. This change also coincided with the adoption of long poly pipelines.

The design of some windmills does not lend themselves to using a Differential Compensator because they cause the mill to work hard(er) on the down stroke. The manufacturers of these windmills will void the warranty on the mill if a double acting pump is used. The Differential Compensator effectively creates a double acting pump.

The Compensator is positioned at the top of the Rising Column – usually just above the Tee Piece. However it can be placed well up the Tower to enable a secure anchoring inside the Tower. If this is done it is wise to think about the pressure that the seals are under.



It is important that the Compensator be positioned **centrally** in the Tower (in line with the windmill pump rod), and that it is **vertical**. If installed without care the Compensator will be troublesome. Proper diligence will help, as will the use of a Rod Centraliser. Clamping the Column below the Compensator and Guiding the Rod above the Compensator is paramount.

Ideally the size (the internal diameter) of the Compensator should be as small as possible. In reality the size will likely be 1.3/8" as this is the most common size.

