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RIC Tests and Winding Styles

While most users of the MCE test equipment are familiar with Lap Windings and Concentric Windings, there is a third style of winding that can cause some confusion when interpreting a RIC test.

A Consequent Pole Winding is a three-phase AC induction motor winding that is concentric wound (coil inside of a coil), but it only utilizes half the coil groups of a Concentric Winding. Where a normal concentric four-pole winding will have twelve groups of coils (four poles x three phases), a consequent pole winding will only have six groups. While the turns per slot will remain the same, it requires less time at the winding machine grouping coils. In a concentric wound motor, the coils are connected in a manner that will result in having the coil polarity alternate with pole and every phase.

For example in a Three-Phase, Four-Pole Motor:

Where: CW= South pole (clockwise)

CCW = North pole (counter-clockwise)

First Pole Group: A Phase – CW; B Phase – CCW; C Phase – CW.

Second Pole Group: A Phase – CCW; B Phase – CW; C Phase – CCW.

Third Pole Group: A Phase – CW; B Phase – CCW; C Phase – CW.

Fourth Pole Group: A Phase – CCW; B Phase – CW; C Phase – CCW.

In a Consequent Pole motor however, six coil groups are all connected to the same polarity. The consequential result of this connection is opposite magnetic poles, created in between the physical windings in the motor's stator. Thus six coil groups, creating twelve magnetic fields.

Motor nameplate information does not tell the technician if they have a Consequent Pole Winding. When viewing the RIC test of a Consequent four-pole motor, it may appear that you are looking at a two-pole motor, seeing only a complete A, B, and C phase sinusoidal pattern through 180 degrees, instead of 90 degrees. Therefore, the technician needs to pay attention to the RIC graph displayed as they are performing the test. If at the end of 90 degrees on a four-pole machine you do not see a complete sign it is recommended to continue the test for at least an additional 90 degrees.

You are invited to submit an Electric Motor Testing Tip of your own and receive a free PdMA mug or hat if we publish it! Contact Lou at 813-621-6463 ext. 126 or lou@pdma.com.