FAQ# 940-1F120

AMCI Frequently Asked Question

What Causes the Resolver Counts to Vary or Jump?

There are three basic components of a resolver system, the resolver, the cable, and the controller, which is PLC plug-in module or a stand-alone unit. When operating, the controller sends a reference voltage to the rotor of the resolver. This signal is magnetically coupled into the resolver's two stators, each of which sends a signal back to the controller. The ratio of the two stator signals is then used to calculate the absolute position of the resolver.

What if my resolver is gaining or losing counts?

Resolvers are absolute devices. They do not gain or lose counts. Each time the controller determines the resolver's position; it is as if it is determining the position of a newly attached resolver. If your resolver system is gaining or losing counts with each machine cycle, than there is a problem with slipping in the mechanical system.

The best way to determine if this is occurring is to make a continuous mark on both the machine and on the resolver's shaft. Run the machine. If, after several cycles, the marks are no longer lined up, than you know that the resolver's shaft is somehow slipping. If the marks are still aligned, repeat the above procedure for any coupled parts between the resolver and the motor.

What if my resolver counts are jumping?

Electronic noise or improper wiring typically causes the counts to jump.

- **The resolver signals are not correctly paired.**

  Every resolver has three pairs of signals, R1–R2, S1–S3, and S2–S4. The best choice for resolver cable is a low voltage cable with individually twisted shielded pairs. Cross talk between the resolver's signals may occur if the signals listed above are not correctly paired in the cable.

- **The cable shields are not correctly connected. For example:**

  - The shields are not attached to the controller. Not attaching the cable shields will cause the shield wires to attract noise instead of draining it away.
  - The shields are attached at both the controller and the resolver end of the cable, creating a ground loop. The cable shields should be attached only at one end of the cable run. Because the electronics cabinet is typically better grounded than the machine, AMCI requires that the cable shields be connected to the controller, and not the resolver transducer.
  - There are junctions in the cable and the shields are terminated at the junction. Junctions in the cable are allowed, however, the shields must be treated as signal carrying conductors at the junction and isolated from chassis ground in the box.

  To verify that the cable shields are correctly installed, remove the shields from the controller. Use a multimeter to verify that there is no connection between the shields and the earth ground bus. If there is a connection, the shields are somehow attached to the earth ground, and a ground loop condition may have been created.

- **The cable shields are correctly installed, however the counts are still jumping.**

  Even though the cable shields are correctly installed, the connection between the controller's shield pin and the mounting chassis may not provide a good low impedance path to ground. If this is the case, run a heavy gauge wire from the shield pin to your earth ground bus.

- **The resolver cable is located in a conduit carrying high power signals.**

  Resolvers use low voltage and low power signals. The resolver cable can be installed in conduit along with other low power cabling such as communication cables and low power ac/dc I/O lines. It cannot be installed in conduit with ac power lines or high power ac/dc I/O lines.

WHAT CAUSES THE RESOLVER COUNTS TO VARY OR JUMP?

Counts jumping on HTT multi-turn transducers

All of the above cabling and shielding points apply to both single and multiturn resolver based transducers. However there are some specific reasons that the counts of an HTT Multiturn transducer might jump, and those are listed below.

1) HTT-20-(X), HTT-400-(X), and HTT425-YYY-(X) resolver transducers use a Beldin 9731 cable to connect the controller to the resolver transducer. Even though only five conductor pairs are required, this cable has six conductor pairs. To keep the unused pair from acting as an antenna, the brown/black and red/black pairs are connected in parallel. Using only one pair, or using only one wire in each pair, may cause the resolver's counts to jump.

2) The four possible full scale turn values for the HTT multiturn resolver transducer packages are 100, 180, 1000, and 1800 turns. (The 1000 and 1800 turn transducers are simply 100 or 180 turn transducers with an additional 10:1 gear box installed.) If the electronics unit is not correctly programmed, for example programming the unit for a 100 turn transducer when a 180 turn transducer is being used, the count data will jump forward and backwards as the resolver's shaft rotates.