# AVOIDING NOISE ERRORS IN TORQUE SENSING/CONTROL SYSTEMS

When introduced in 1963, Himmelsteins' MCRT® non-contact torquemeters set a new standard for noise-free measurements. They retained the best features of slip ring devices -- high quality strain gage sensing, static and dynamic response, almost unlimited configuration flexibility and accuracy traceable to dead weight calibrations. Their transformer couplings offered long, noise-free life while eliminating brush noise, brush/ring wear, errors from wear products shunting gages, and susceptibility to oil contamination.

The first MCRT® torquemeters were also immune to industrial machinery noise common to that era. Since then, industrial noise has become much more severe, partly due to widespread use of adjustable speed drives with very high speed IGBT's. Electrical noise generated by many of these drives is bad enough to cause arc-over in motor bearing races inducing premature bearing and insulation failures.

Option G hardens MCRT® torquemeters to this noise. It is standard on Himmelstein premium torquemeters and an extra cost option on our non premium models. No competitive product approaches its level of noise immunity. When asked, competitors respond "our products aren't affected by noise" or, "ferrite cores provide noise shielding." That is nonsense. Every measurement is impacted by noise; the issue is how much noise is output, not whether there is any. Ferrites don't solve problems, they exacerbate them -- see following discussion.

***When operating in severe electromagnetic interference (EMI), even Government mandated tests aren't reliable guides to torquemeter noise immunity***. For example, both standard and noise hardened (Option G) MCRT® torquemeters passed EU 89/336/EEC electromagnetic radiated and electrostatic discharge immunity tests and are CE marked.

Nonetheless, when subjected to a high (400 oersteds) magnetic field at line frequency, an Option G torquemeter is unaffected, while a non-hardened version has errors in excess of 10%. You can expect errors up to 100% from competitive, ferrite core torquemeters. That's because ferrites have lower permeability and saturate at lower flux levels than alloy cores[1]. We will be glad to demonstrate these effects.

The results obtained by subjecting torquemeters to strong, 60 hertz fields are important because such fields are ubiquitous. They illustrate the danger of relying on conventional EMI testing to evaluate noise immunity. They also conclusively demonstrate the superiority of Option G torquemeters relative to competitive products. These results are especially compelling because ***a carrier amplifier has high immunity to 60 hertz signals.***

1. Typical ferrites have: initial permeability of 1200, a 3800 gauss saturation flux, 300 °F Curie temperature, and 7,000 psi tensile strength. MCRT® torquemeter cores have: initial permeability of 30,000, 11,000 gauss saturation flux, 860 °F Curie temperature and 65,000 psi tensile strength. In addition to greater tolerance to large fields, non-ferrite torquemeters have great mechanical strength, are immune to thermal and mechanical shock and unlikely to see errors or failures as machinery soak temperatures rise to high values.

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