

2018 ISA Water/Wastewater and Automatic Controls Symposium

August 7 to 9, 2018 • Hyatt Regency Bethesda • Bethesda, Maryland, USA

Presented by the ISA Water/Wastewater Industries Division – www.isawwsymposium.com

Technical co-sponsors: Chesapeake AWWA Section, the WEF Intelligent Water Technology Committee, Chesapeake Water Environment Association, and ISA Baltimore-Washington Section



August 6, 2018 – Optional Short Course

Overview of Electrical Noise Effects on Instrumentation Control Equipment

ISA Course TI21C

Course Description

Length: 1 day

Date: Tue, August 6, 2018

CEU Credits: 0.7

Course Hours: 8:00 a.m. – 4:00 p.m., includes lunch

Price: \$650 for ISA members, \$730 for affiliates, \$815 list & community members

Description:

This course provides an understanding of grounding, both from an electrical systems relationship and from an instrument loops relationship. The purpose of grounding and electrical systems, grounding for safety, signal noise, signal wiring systems, and methods used to reduce noise will be covered.

You will be able to:

- Discuss the relationship between earth ground to electricity and electrical shock
- Explain why some electrical systems are connected to earth ground
- Use the National Electric Code (NEC) as standard for grounding instrument systems
- Illustrate how people become part of an electrical circuit and how to avoid it
- Define what a ground loop is
- Compare noise and interference and how they are transmitted
- Identify instrument signal wiring and conductors
- Use methods to reduce instrument noise
- Identify the effects of harmonics on power systems, control systems, and computers

You will cover:

- Grounding: NEC definitions | Earth Ground
- Considerations Relevant to Grounding and Protection from Electrical Shock
- Techniques of Grounding Wye and Delta Transformers
- Methods of Grounding Electrical Systems
- Isolated Grounding and Resistance (Impedance)
- Ground Loops in Instrumentation Systems
- Noise: What is Electrical Noise | What is Interference
- How is Noise/Interference Transmitted
- Methods of Shielding and Grounding of Instrument Systems to Reduce Noise/Interference
- Power Quality for Electronic Equipment: Need for Power Conditioners | UPS Systems, and Surge Suppression Devices
- Power System Harmonics: Their Cause and Effects | Measuring Total Harmonic Distortion and Pinpointing Various Sources of Harmonics

Classroom/Laboratory Exercises:

- Check body resistance and compare results
- Measuring Total Harmonic Distortion

About the Instructor



Gerald Thomas is a professor emeritus of Corning Community College and is the owner of Technical Training Services, a consulting firm based in New York. He has developed and taught courses in microprocessor systems, digital electronics, and industrial control systems to engineers and technicians from industry. His engineering experience includes working for Hewlett-Packard and IBM. He presently works as a training consultant to a variety of industries. He started teaching for ISA in 1983.

Course Schedule

DAY	Topics, Exercises, Etc.
A.M.	Course Introductions Pre Instructional Survey Section 1: Definitions Demonstration 1 Magnetic Lines Surround Us Section 2: Electrical Noise VS Safety Lab Exercise 1 Body Resistance Section 3: Anatomy of Electrical Noise Section 4: Power Source Grounding Section 5: Ground Loops Lab Exercise 2: Temperature Loop Problems
P.M.	Section 6: Hazardous Area Grounding Section 7: Radiated Electrical Noise Section 8: Interference (Noise) Control Section 9: Power Quality Video – Fluke Power Quality Video – Fluke Harmonics Optional Lab 3 Post Instructional Survey Final Course Evaluation