

## Instrumentation Diagrams and Symbols (FG15C)

This course presents the methodology for developing and applying instrument and control drawings. You will develop actual documents for a simple project to aid your understanding.

You will be able to:

- Familiarize yourself with the documents used to define instrument and control systems, including: Process Flow Diagrams, Piping & Instrumentation Drawings, Instrument Lists, Specification Forms, Logic Diagrams, Location Plans, Installation Details, Loop Diagrams
- Explain the type of information included on each document
- Identify the sequence of document development for a typical project
- Identify some process control devices and the symbols used to define them
- Identify the ISA Standards available to assist you in developing and understanding instrument and control documents

## Overview of Measurement & Control Fundamentals (FG05C)

This overview of industrial measurement and control uses a generally non-mathematical approach to the following topics:

- Concepts of Process
- Documentation
- Flow Measurement
- Level Measurement
- Pressure Measurement
- Temperature Measurement
- Final Control Elements
- Overview of Process Dynamics
- Control System Hardware
- Controller Modes and Tuning

## Safety Instrumented Systems - The Must Know for Implementation (EC50C)

There are many different ways of designing safety instrumented systems. This course covers the basics of what needs to be done in the design and selection of safety systems.

- Introduction: What is a Safety System? | Danger of Overconfidence and Complacency | Lessons Learned from Past Accidents
- Guidelines and Standards: ANSI/ISA | IEC
- General SIS Design Considerations: Design Life Cycle | Independent Safety Layers
- Hazard and Risk Assessment: Hazard Identification | Risk Assessment | Determining SILs | Layer of Protection Analysis (LOPA)
- Failure Modes: Safe vs. Dangerous | Redundancy Issues
- System Technologies: Relay | Microprocessor | Field Devices | Certification vs. Prior Use
- Operation and Maintenance: Installation | Testing | Management of Change

## Overview of Grounding and Noise Reduction for Control Equipment (TI21C)

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.

Topics examined include

- 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

## Picking the Right Bus - A Comparison of Field and Device Networks (FG30C)

The industrial market offers a variety different field, device, and sensor buses, all being promoted as the ideal solution for the plant floor. There is little doubt that data buses can save your company money, but how do you select the right one for different plant requirements?

This course provides an introduction to the fundamentals of industrial data buses for automation and process control applications, and presents an unbiased view of the marketplace so you can make an informed decision.

Participants will take an in-depth look at today's dominant data bus technologies and compare their uses and features. The basic strategy behind each bus is outlined, including the type of applications where each data bus system is best and least suited. The seminar will look at the wiring and installation requirements for each bus, as well as the highest levels of application interface for each bus. The bus protocol will be reviewed, but only enough to help you understand the differences.