

# SMART TRANSMITTERS AND SINGLE LOOP CONTROLLERS (REF:OTSSMT001)

## Course Objectives

To gain an understanding of smart transmitters and single loop controllers.

## Course Description

This lesson introduces digital electronics and teaches the principles of operation, the functions of the electronic components, and the signal characteristics. The lesson also demonstrates operation of the hand-held interface for system configuration.

## Who Should Attend

Attendees should be familiar with digital signal transmission, process control principles, and the function of transmitters in process loops.

## Pre-Requisites

All Attendees should have an instrumentation, electronic or operations background.

## Course Outcome

At the end of this course you will be able to maintain Smart Transmitters and Single Loop Controllers.

## Course Outline

### Day 1

#### Introduction

- Describe the principles of analog and digital signal theory
- Describe the benefits of digital signal transmission
- Describe and identify the signal processing capabilities of smart transmitters
- Describe the major features and characteristics of smart transmitters
- Describe the characterization function, special installation requirements, and signal conditioning of a smart transmitter

### Day 2

- Describe the function of a hand-held interface device
- Describe configuration parameters and demonstrate configuration of a smart transmitter
- Describe the test functions of smart transmitters
- Demonstrate the procedure for doing a loop test with a hand-held interface
- Describe the use of a smart transmitter in a temperature, flow, or pressure measurement loop.

### Day 3

- Describe digital controller principles and capabilities
- Recognize alarm conditions and solve self-diagnostic errors
- Identify and use the features on a display panel
- Identify and state the function of various controller boards
- Demonstrate how the controller processes analog and digital input signals
- State the purpose of function blocks
- Demonstrate the procedure for diagramming a controller configuration

### Day 4

- Read PID, feed forward, and cascade controller diagrams
- Identify different programming devices
- Label configuration keypad buttons and use them to enter configuration data
- State the purpose of the lockout function and locate the lockout switches
- Label and use the portable configurator to enter data
- State the purpose of tuning and list the different tuning methods
- Explain self-tuning principles
- Explain when an adaptive control is needed
- Explain automatic tuning principles.



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## Day 5

### *Introduction to Foundation Fieldbus Technology*

- Physical installation of a fieldbus system
- Software configuration and field operation
- Fieldbus communications
- H1 interoperability
- Introduction to the High Speed Ethernet (HSE)
- Comparison between H1 and Profibus PA
- An overview of the benefits of using H1

### *The HART Protocol*

- The Highway Addressable Remote Transducer (HART)
- HART overview
- How it works
- Commissioning
- Diagnostics
- Multivariable instruments
- Multidrop networking
- Control in the field

## Course Review and Feedback

