Emerson Educational Services

Maximize Your Investment with Well-Trained Personnel
Course Types

On-site Traditional
Through our onsite training services, we provide customers a Certified Instructor, courseware literature, and all hardware associated with supporting hands-on workshops. In North America, we deliver onsite training courses sponsored through our Local Business Partners’ Education Program. This allows our customers the opportunity to access our Training Courses through their local business partner.

Virtual Learning
Emerson’s Virtual Classroom delivers real-time value-based Instructor-Led Training to customers’ desktops with full access to software systems. Students connect directly to classroom based machines for the entire class! There is no travel required which means fewer expenses for our customers. Class takes place in a live online training room using a teleconference bridge.

eLearning
Emerson eLearning offerings are professionally developed, engaging, flexible and up to date. Emerson online learning programs provide a convenient opportunity to study about our technologies and solutions at any time. Our goal is to provide our customers a competitive advantage by empowering them with the latest knowledge in a growing range of topics.

Blended Learning
Blended Learning is a contemporary approach to training that “blends” different teaching methods and deploys them via digital and online media to maximize the effectiveness and convenience of learning. The Emerson’s Blended Learning approach combines various learning methods using a variety of digital media. Blended Learning is Emerson’s unique approach to delivering quality education while reducing learner time away from the facility.

“Experiential [learning] is a philosophy and methodology in which educators purposefully engage with students in direct experience and focused reflection in order to increase knowledge, develop skills, and clarify values.”
General Information

IACET Authorized Provider

Educational Services is an Authorized Provider of International Association for Continuing Education and Training (IACET) Continuing Education Units (CEU). IACET Authorized Provider Status Means our Organization:

- Demonstrates compliance with proven, research-based standards created in cooperation with the U.S. Department of Education
- Is dedicated to high standards for quality in continuing education and training
- Awards the IACET EDU, the hallmark for quality in continuing education and training

Educational Services is proud to have received Authorized Provider status. We look forward to the opportunity to share our training with you.

Qualifications for Enrollment

Educational Services agrees to accept for training, individuals who are not competitors of Emerson Automation Solutions in the field to which the training pertains. Educational Services will provide reasonable accommodations to students who have a physical or mental impairment that substantially limits one or more major life activities, as long as the accommodation does not put undue hardship on the company.

Course Scheduling, Locations & Pricing

Course schedule and locations including length, dates of each session and price are listed on the Educational Services MyCONNECT website. All prices are in U.S. dollars. For the most up to date information call or visit our website at: www.emerson.com/education

Tuition

Methods of payment include: purchase order, acceptable credit cards include: Visa, MasterCard and American Express. All tuition is subject to change without notice. Transportation, personal expenses and most meals are the responsibility of the student.

Cancellations & Transfers

If your plans or budgets change you may cancel/transfer your reservations up to 14 calendar days prior to start of the course without incurring a cancellation charge. Limited enrollment makes it necessary to charge 50% of the full tuition for cancellations/transfers received during the 14 days prior to the start of the course, and full tuition for failure to attend without cancelling. Substitutions are accepted until the first day of class.

Arrival & Departure Time

Students should plan to arrive the day prior to the course starting day, as class typically begins at 8 a.m. If traveling by air, please allow sufficient time to travel to the airport and check-in when scheduling return transportation.

Course Materials

All materials presented are copyrighted. Audio and video recording is prohibited and no material or portion of any school may be reproduced in any manner without prior written approval. All necessary documentation, catalogs, and literature are included in the course tuition. The training materials were developed by and for Emerson Educational Services exclusive use.

On-Site and Local Training

Educational Services instructors are available to provide expert training anywhere in the world. We can conduct training tailored to meet your needs at your facility or regional and local sites. To learn more about on-site and local training contact your local Emerson service provider or call 1-800-338-8158 or 641-754-3771.

eLearning

Training courses are available to you on-line. You can learn at your pace and on your time. For more information please visit our web page: www.emerson.com/education
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AMS - AMS Device Manager – 7020
CEUs - 2.1

Overview
Completing 3-days of AMS Device Manager hands-on instructor assisted training modules and exercises, provides the quickest route to your productive use of this predictive maintenance application.

Topics
• Viewing and Modifying Devices
• Creating a Plant Database Hierarchy and Adding Devices
• Using the Field Communicator with AMS Device Manager
• Using the AMS Device Manager Browser Functions
• Audit Trail
• Calibrating Device - Calibration Assistant
• Configuring and Monitoring System Alerts
• Installing an AMS Device Manager Server Plus Standalone
• Starting AMS Device Manager for the First Time
• Network Communication Interface Setup
• AMS Device Manager Database Management
• Installing a Distributed System
• Installing Device Types from Media
• MV Engineering Assistant SNAP-ON Application
• QuickCheck™ SNAP-ON Application
• AMS Device Manager OPC Server and the Matrikon OPC Explorer
• AMS Device Manager Web Services
• AlertTrack™ SNAP-ON Application
• Wireless SNAP-ON Application

Audience
This course is intended for technicians and engineers who need to configure and use AMS Device Manager.

AMS - AMS Device Manager w/Rosemount HART® Instruments – 7021
CEUs - 2.1

Overview
Learn the installation, calibration, maintenance, and troubleshooting of measurement instrumentation using AMS Device Manager. This 3-day course teaches maintenance and calibration of measurement devices using AMS Device Manager software to communicate and track information. The student will learn how pressure and temperature transmitters function, are installed, and calibrated using AMS Device Manager. The course uses hands-on training, labs, and lecture to teach the student how to:
• configure and use AMS Device Manager correctly perform transmitter installation and setup procedures
• properly configure HART® transmitters
• properly calibrate transmitters
• perform basic troubleshooting-transmitters

Topics
• Configuring and Using AMS Device Manager
• Viewing and Modifying Devices
• Creating a Plant Database Hierarchy and Adding Devices
• AMS Device Manager Browser Functions
• Audit Trail
• HART® Communication
• HART Transmitters (3051C, 3144P)
• Test Equipment Selection
• Transmitter Installation and Configuration
• Transmitter Calibration
• AMS Calibration Assistant
• Intelligent Calibrators
• Transmitter Troubleshooting

Audience
The hands-on focus is on skills required by engineers, technicians, or others that are new to the plant or instrument environment.

AMS - Device Manager with DeltaV – 7039
CEUs – 2.8

Overview
This 4-day course is for instrumentation technicians responsible for all areas of managing and ensuring the reliability of instrumentation in the plant process including startup and commissioning, normal operations, maintenance, and troubleshooting.

Topics
• DeltaV and PlantWeb Overview
• AMS Device Manager Overview
• FOUNDATION™ fieldbus Overview
• ValveLink™ SNAP-ON Introduction
• ValveLink™ DVC Setup
• ValveLink™ SNAP-ON Tests and Diagnostics
• HART® Overview
• PROCONEX QuickCheck SNAP-ON
• PROFIBUS Overview
• PlantWeb Alerts
• AMS Device Manager User Interface
• Setup and use of Alert Monitor in AMS Device Manager
• Device Replacement for HART, Fieldbus, and PROFIBUS Devices
• AMS Device Manager Audit Trail
• AMS Device Manager Calibration Assistant
• Smart Commissioning

Audience
The target audience usually does following:
• Responds to work orders created to calibrate, troubleshoot, repair, service, and replace instruments and valves
• Monitors alerts to preemptively address problems prior to operators seeing a problem in the control room
• Provides loop testing & assistance with instrumentation in plant turnarounds, startups, and for project work
• Improves process availability & reduces operations and maintenance costs

Prerequisites
Microsoft windows experience. Minimal DeltaV and AMS experience is recommended but not required. Recommended to take 7018, but not required.
Bettis™ - Gas/Hydraulic Product Servicing - VA101
CEUs - 2.0

Overview
This 4-day course uses classroom style lectures and hands-on experience with working models to teach students on the following topics: assemble, install, operate and maintain a Bettis™ gas/hydraulic actuator; use troubleshooting techniques and test to identify problems in gas/hydraulic systems, and perform routine maintenance and emergency repairs on each component; install Bettis control component on the corresponding actuator, connect calibration equipment and carry out set-up and calibration procedures; adapt and install control upgrade or modification kits including all tubing connections and final adjustments; and identify graphic fluid schematic symbols, match to actual control device and integrate the symbols into a functioning relationship.

Topics
• Gas/Hydraulic Actuators
• Gas/Hydraulic Control Systems
• Gas/Hydraulic Control Systems Accessories
• Control Applications
• Control Component Calibration

Prerequisite
Students should be involved with the application, service or maintenance of Bettis™ gas/hydraulic actuator systems.

Bettis™ - MCP & M2CP – Maintenance & Field Service – Level 1 – VA111
CEUs – 1.6

Overview
Fundamental overview of the construction, assembly, hardware, software and configuration of Emerson’s Bettis MCP & M2CP actuators. Students attending this program will demonstrate an ability to identify actuators, hardware, components and assemblies. All students will demonstrate the ability to setup, configure, check and verify operation of various actuator configurations using appropriate hardwar and software.

Topics
• Identify main mechanical components and understand the function of Emerson’s Bettis Tec2 actuators
• Identify main components and understand function of the non-intrusive Tec2 control package.
• Setup and Commissioning
• Identify function and main components of bevel gears and worm gears
• Introduction to DCMLink

Prerequisites
Students should have a minimum of one year field service experience and a working knowledge of Bettis M2CP actuators.

Bettis - TEC2000 & TEC2 - Maintenance & Field Service - Level 1 - VA114
CEUs – 1.6

Overview
Fundamental overview of the construction, assembly, hardware, software and configuration of Emerson’s Bettis Tec2000 and Tec2 actuators. Students attending this program will demonstrate an ability to identify actuators, hardware, components and assemblies. All students will demonstrate the ability to setup, configure, check and verify operation of various actuator configurations using appropriate hardware or software.

Duration: 2 Days
Who Should Attend:
Field Service Technicians
Sales Engineers
Quotation Managers
Instrumentation and Control Technicians

Prerequisites
Students should have a minimum of one year field service experience and a working knowledge of Bettis MCP & Tec2 actuators. Students attending this program will demonstrate an ability to configure each actuator, hardware, software and assemblies. All students will demonstrate the ability to setup, configure, check and verify operation of various actuator configurations using appropriate hardware or software.

Bettis – ICON & EPI Product and Sales Training - VA132
CEUs – 1.6 – Continued...

Topics
• Applications for each model and competitive analysis
• Mount and calibration procedures

Audience
Inside Sales Engineers
Outside Sales Engineers
Quotation Managers
Marketing Professionals

Prerequisites
Students should be involved with the sales and marketing of electric actuators (EIM, Biffi, Bettis, etc.)

Bettis - XTE3000 Maintenance & Field Service - Level 1 - VA134
CEUs – 1.6

Overview
This course presents the fundamental aspects of Bettis XTE3000 actuators. Attendees are presented with essentials of design and operation and how they operate the valves. Basic components and assemblies are identified to aid in understanding the basic controls, applications, and mechanical operation. Each student will learn how to set travel limits, torque limits and operate an actuator on or off the valve. Model number interpretation, document relevance (Spec Sheet; Manuals; Wiring Diagrams; Outlines; Assembly Drawing) and support resources will be discussed.

Topics
• Identify main mechanical and electrical components
• Understand the control inputs, feedback outputs, and optional modules for the Bettis XTE3000 actuator
• Setup and Commissioning
• Status LED codes and fixes
• Configuration with AManager software
• Diagnosing and resolving error codes

Audience
Field Service Technicians
Sales Engineers
Quotation Managers
Instrumentation and Control Technicians

Prerequisites
Students should have a minimum of one-year field service experience and a working knowledge of Bettis ICON actuators.
| Bettis – XTE3000 Maintenance & Field Service - Level 2 - VA135  
| CEUs – 1.6  
| **Overview**  
| This course presents how to retrofit legacy ICON3000 actuators with current cards. Attendees will complete a full teardown and reassembly on an ICON3000 to reinforce the theory of operation and component identification. Various software programs will be utilized to program processor cards. In depth review of advanced configurations, maintenance and troubleshooting practices.  
| **Topics**  
| • Identify main mechanical and electrical components  
| • Replacing older version electronics cards  
| • Optional communication/BUS cards  
| • Utilization of ICON 2K, 4K, and AManager software to program cards  
| • Diagnosing and resolving error codes  
| **Audience**  
| Field Service Technicians  
| Sales Engineers  
| Quotation Managers  
| Instrumentation and Control Technicians  
| **Prerequisites**  
| VA134 or a minimum of 2 years of hands-on experience with the product.  

| Bettis™ Rack & Pinion & Scotch-Yoke Product Servicing - VA103  
| CEUs – 2.8  
| **Overview**  
| A 4-day class introducing comprehensive information concerning the installation, operation and maintenance of Emerson Bettis™ Houston WACC products.  
| **Topics**  
| • Valve Automation Center Contract Review  
| • Installation/Maintenance Instruction Manuals  
| • Product Serial Numbers Review  
| • Service Procedure Index Review  
| • General Operating/Maintenance Instructions  
| • General Servicing Information on RPB, RPC, RP, RPE, CB, CBA, CBB, CBAX30, HD, T, and G-Series Actuators Review  
| • Hands-on Training EG, Conversions of actuator fail directions from CW to CCW and CWW to CW  
| • Field Service Work Performed by VAC's, Bettis™ Houston WACC Procedure Review  
| • Five days of Practical Exercises Involving the Disassembly and Reassembling of Emerson Bettis™ Houston WACC Products  
| • Features and Benefits Emerson Bettis™ Houston WACC Products for field maintenance  
| • How to trouble shoot field problems  
| • How to add features (options) to existing actuators  
| • Introduction to pneumatic controls  
| • Introduction to actuator to valve mounting hardware  
| **Prerequisites**  
| Work in the valve automation industry: shop assembly or field maintenance  

| Bettis™ Rack & Pinion & Scotch-Yoke Products - VA104  
| CEUs – 3.2  
| **Overview**  
| A 5-day class introducing the range of pneumatic and hydraulic valve actuators manufactured by Emerson Bettis™ in their Houston, Texas WACC facility. In addition to discussing product features and benefits, students will be given a broad overview of the valve automation industry and provided with training of product selection and applications. Common pneumatic and hydraulic control components and systems will also be discussed; and a review of competitive products.  
| **Topics**  
| • RPE Series actuators review  
| • CBA300 Series actuators review  
| • CBB Series actuators review  
| • G-Series actuators review  
| • Bettis™ electronic data formats overview  
| • Torque mechanisms overview  
| • Manual overrides overview  
| • Actuator selection sizing  
| • Common control components/control systems overview  
| • Valve mounting hardware overview  
| • Competitor product comparisons  
| • General practical work  
| • Features and Benefits of Bettis™ Houston WACC Products  
| • What is torque?  
| • Selection and sizing quarter turn actuators  
| • Selection and sizing basic control elements  
| **Prerequisites**  
| Work in the valve automation industry: Sales, Quotations  

| Bettis - RTS Electric Actuator - Product & Sales Training - VA124  
| CEUs – 0.8  
| **Overview**  
| Fundamental aspects of Bettis RTS actuators. Attendees are presented with essentials of design and operation. Basic components and assemblies are identified to aid in understanding the basic controls, applications, and mechanical operation. Each student will be shown basic commissioning procedures for the different RTS models. Target applications and a competitor analysis will be reviewed.  
| **Topics**  
| • Identify main mechanical and electrical components of Bettis RTS actuators.  
| • Understand the theory of operation and fail-safe mode of operation  
| • Understand different modes of operation and the Smartcon Control features  
| • Setup and Commissioning  
| • Applications and competitor analysis  
| **Prerequisites**  
| Students should be involved with the applications, marketing, or sales of Bettis RTS products
Bettis - Electric Actuator - Sales Training on M2CP, TEC2, & Torqplus - VA113
CEUs – 1.6
Overview
This course presents attendees with the fundamental aspects of Bettis Electric actuators, focusing on Bettis M2CP, TEC2, and TorqPlus. The Theory of Operation, mechanical and electric design, available sizes and configuration of each actuator model are covered during this 2-day class. Students will be presented with basic wiring diagrams and calibration procedures. Sizing and configuration exercises will cover how to order actuators from the appropriate channel.
Topics
• Mechanical and Electrical component identification of Bettis M2CP, TEC2, and TorqPlus
• Function of adding worm gears and bevel gears to actuator assemblies
• Mount and calibration procedures for each electric actuator model
• How to properly size and configure Bettis Electric actuators
• Applications for each model and competitive analysis
Prerequisites
Students should be involved with the application, marketing, or sales of Bettis electric actuator products.

Bettis - Electric Actuator Product and Service – RTS – Level 1 – VA123
CEUs – 1.6 – Continued...
• Detailed focus on Ball Screw assemblies & Spring Canisters.
• Detailed focus on both Brake (Fail-Safe & Spring Damping) assemblies.
• Focus on optional Hand-Wheel over-ride assemblies.
• Electronic Board Sets: Logic Board – VFD – Encoder – Motor / location, function, functionality.
• Programming / Set-Up including Speed Controls both (pulsing & non-pulsing) speed changes. Binary Inputs / outputs.
• Alarm function code identification & clearing.
• Smart Tool II Training.

Audience
Repair techs of end users, LBP’s, distributors, Final Control Lifecycle Service techs, etc.

Prerequisite(s)
It is recommended that students bring an android device for Smart Tool AppTraining. A dongle is required for IRDA communication. A single demo device is available for the training.

Bettis - M2CP & TEC2 - Maintenance and Field Service - Maintenance & Field Service - Level II - VA112
CEUs – 2.8
Overview
This advanced course teaches students how to install and configure optional control modules for the Bettis M2CP and TEC2 actuators. All students will be tested on the ability to setup, configure, and troubleshoot various actuator control modules. Students will configure DCMlink to utilize advanced diagnostics tools, live monitoring, and transfer configuration files.

Topics
• Install and configure M2CP Intermediate Switch Modules
• Install and configure TEC2 Optional Control Modules
• Interpret and diagnose Error Alarms and Messages
• Installing DCMlink Software, setting up Networks and troubleshooting

Prerequisites
VA111 or a minimum of 2 years of hands on experience with the products.

### Daniel - Basic Fluid Flow Measurement Course - D4119
**CEUs** – 2.1

**Overview**
This 3-day course is foundation training for technicians, operators, technical support staff, and others who require knowledge of fluid flow measurement, meter selection, maintenance and proving methods. This course relates theory to practice which gives participants a better understanding and appreciation of the oil and gas industry. It is recommended in advance of product specific training courses.

**Topics**
- Introduction to Fluid Flow Measurement
- Basic Flow Measurement Laws
- Types of Fluid Flow Measurement
- Basic Reference Standards
- From Theory to Practice
- Fluids
- Flow
- Operations Considerations
- Maintenance of Metering Equipment
- Measurement and Meters
- Differential Meters
- Linear and Special Meters
- Read outs and Related Devices
- Proving Systems
- Auditing

**Prerequisites**
It is recommended that participants have basic understanding of process instrumentation prior to taking this training.

### Daniel - DanPac Metering Supervisory and Control Systems Operation and Maintenance - D4540
**CEUs** – 1.4

**Overview**
This 2-day course provides students with an introduction into the operation and functionality of a DanPac Metering Supervisory Control System. The instructor will explain the metering system architecture, its function and system administration. Navigation of the operator interface, specific features, basic troubleshooting and benefits of central date collection will also be explained. Full supporting literature will be made available to students.

**Topics**
- Introduction to DanPac System Architecture
- Supervisory Operator Interface Graphics and Controls
- Administration and Security
- Communication Interface
- Plant Control Functions
- System Status Conditions
- Reporting System
- Alarm Handling
- Basic Diagnostics
- System Troubleshooting

**Prerequisites**
Participants should be proficient in personal computer operations and have a basic knowledge of flow measurement.

### Daniel - Natural Gas Orifice Flow Measurement - Advanced - D4320
**CEUs** – 2.1

**Overview**
This 3-day course covers application of metering to natural gas. Coverage of the latest concepts of design and equipment use will be presented to broaden the knowledge of the attendees.

**Topics**
- Design of Meter Stations
  - Contract Requirements
  - Other Concerns
  - Single Versus Multiple Tubes
  - Design Problems
  - Economics Versus Accuracy
- Accuracy of Gas Flow Measurement
  - Definition
  - How Obtained
  - New Concepts
- Influences in Gas Measurement
  - FERC 636 (Government)
  - Economics
  - Standards
  - New Technology
- New Metering Concepts
  - Computers as Analysis
  - New Devices
  - Ultrasonics
  - Vortex Shedding
  - Coriolis
- Future
  - Energy Forecasts
  - U.S. Gas Industry
  - World Gas Industry

**Summary**

**Audience**
The course is designed for experienced gas measurement personnel with basic fundamental knowledge of meters and their operation.
Daniel - Natural Gas Orifice Measurement - Introduction - D4120
CEUs – 2.1

Overview
This 3-day course covers basic principles, application, operation, calculation and maintenance of meters used in the measurement of gas with emphasis on natural gas.

Topics
- Introduction and Overview: Definition of Flow Measurement and a Brief History and Coverage of Common Terms Used in Gas Measurement
- Introduction to Types of Meters
  - Positive Displacement
  - Inferential Head
  - Turbine
  - Others
- Standards for Gas Measurement
- Principles of Meter Operation and Systems
  - Positive Displacement
  - Flow Requirements
  - Measurement System (Readout)
- Meter Details
  - Orifice
  - Nozzle
  - Positive Displacement
  - Ultrasonic
  - Vortex Shedding
  - Target
  - Other
- Secondary System Details
  - Mechanical
  - Electronic
- Accuracy
  - Source of Inaccuracy
    - System
  - Summary
  - Accuracy
  - Economics

Audience
The course is designed for Engineers, field technicians and accounting personnel. Practical examples of real metering facilities will be covered.

Daniel - Operation & Maintenance - Compact Prover - D4270
CEUs – 2.1

Overview
This 3-day course covers the operation, installation and maintenance of the Daniel Compact Prover™.

Topics
- Theory of Operation: Double Chronometry and Specifications
- Overview of the Parts Which Make up the Compact Prover such as Actuator Assembly, Pneumatic Spring Chamber, Piston and Poppet, Optical Switches, Hydraulic Motor and Pump, and Solenoid Valve
- Installation: Prover and Meter Location, Nitrogen Spring Plenum Setting, and Power Requirements
- Troubleshooting and Repair of: Safety Barriers, Seal and O-ring Replacement, Detector Switches, Interface Board, Hydraulic and Nitrogen System, and Spare Parts
- Overview of Calibration: Seal Leak Test, Upstream and Downstream Calibration, and Waterdata Data Sheet
- Overview of Prover Electronics: Programming, Input and Data Modes Using Software/Local Display, Circuit Module Description, and Diagnostics
- Proving Operations: Direct Proving and Master Meter Proving
- Prover Maintenance

Prerequisites
Basic knowledge of flow measurement.

Daniel - Operation and Maintenance of Gas/Liquid Ultrasonic Meters - D4230/D4280
CEUs – 2.5

Overview
This 3-1/2 day course prepares students to install, operate, and maintain Daniel multipath ultrasonic flow meters. In addition to classroom instruction, the training course includes hands-on experience using the flowmeter, simulator and diagnostic software.

Topics
- Basics of Sound Waves
- How Ultrasonic Flow Meters Work and Their Advantages over other Meters
- The Performance Characteristics of Transit Time Ultrasonic Flow Meters
- System Components and Mark III Electronics, including the Central Processing Unit (CPU) Board and the Option Board
- Meter Mechanics
- Removal and Installation of Transducer Assemblies
- Volumetric and Mass Ultrasonic Gas Flow Measurement
- Meter Installation Considerations
- Inform the Instructor if Working on Liquid Meter

Daniel - Operation and Maintenance S600 + Flow Computers - D4262
CEUs – 2.1

Overview
This 3-day course provides students with an appreciation of the operation, design, capabilities and configuration of the S600+ flow computer. This hands-on course deals with file transfer and machine recovery as part of the maintenance scope. The instructor will make use of the latest configuration software. Full supporting literature will be available to all students.

Topics
- Introduction to the S600+
- Board Removal and Layout
- Keypad Access and Security
- Menu Navigation
- Data/Mode Changing
- Alarm Handling and Configuration
- Configuring and Generating Reports
- Application Specific Functions
- Cold/Warm Starting Modes
- File Back-Up and Download
- Using the Configuration Software

Prerequisites
Basic knowledge of flow measurement.

Daniel - Operation and Maintenance Control Valves and Turbines - D4290
CEUs – 2.1

Overview
This 3-day course covers the operation, installation and maintenance of the Daniel control valve and turbines.

Topics
- Theory of operation: Turbines, Valves, Digital Pilots
- Disassembly and Reassembly of Turbine Internals
- Disassembly and Reassembly of Valve Cylinder Assemblies
- Disassembly and Reassembly of Digital Pilots
- Valve Needle Valve Adjustment
- ‘A’ series vs. ‘B’ Series Control Valves
- Turbine Pick-Off Sensor and Preamp
- Flow Conditioning
- Parity vs UMB Series Turbine
- Meter Troubleshooting

Prerequisites
Basic knowledge of flow measurement.
### Daniel - Operation and Maintenance S600 Flow Computers - D4260

**CEUs – 2.1**

**Overview**  
This 3-day course provides students with an appreciation of the operation, design, capabilities and configuration of the S600 flow computer. This hands-on course deals with file transfer and machine recovery as part of the maintenance scope. The instructor will make use of the latest configuration software. Full supporting literature will be made available to all students.

**Topics**  
- Introduction to the S600  
- Board Removal and Layout  
- Keypad Access and Security  
- Menu Navigation  
- Data/Mode Changing  
- Alarm Handling and Configuration  
- Configuring and Generating Reports  
- Application Specific Functions  
- Cold/Warm Starting Modes  
- File Back-Up and Download  
- Using the Configuration Software

**Prerequisites**  
Basic knowledge of flow measurement.

### Daniel - Senior Orifice Fitting - Introduction - D4420

**CEUs – .7**

**Overview**  
The students will learn the operation and how to repair and troubleshoot the Model 2000.

**Topics**  
- Theory of Operation  
- "C" Style vs. Model 2000  
- Maintenance  
- Operation Instructions  
- Installation  
- Hands-On Learning  
- Troubleshooting  
- New Features of M2000

**Audience**  
This 1-day course is for the beginner or experienced technicians.

**Prerequisites**  
Basic knowledge for flow measurement.

### Daniel - Ultrasonic Flowmeter with Mark III Electronics - Introduction - e4610

**Overview**  
This Course introduces the basic elements and concepts of the Daniel Ultra Sonic Flow Meter, equipped with MarkIII Electronics. Historical look at transducers, concepts involved with Flow Meters, Wiring Connections, and MeterLink Software.

Basic understanding of USM with MarkIII Electronic
**Overview**
This 2-day course product training course provides an overview of the valve automation products manufactured by Dantorque™. Primarily focused on product features & benefits, sizing/selection and applications; service/maintenance training can also be provided if requested in adv. of the class. Classes will be tailored to meet specific needs.

**Topics**
- Introduction
- Overview Dantorque™ Actuators
- Onshore, Offshore and Subsea Applications
- General Control Options
- Subsea Control Options
- ROV Overrides
- Actuator Sizing/Selection
- Question and Answer Session

**Prerequisite**
Students should be involved with the purchase, application, marketing, sales or service/maintenance of Dantorque™ products.
DeltaV – Administration - 7027
CEUs – 3.2

Overview
This 4-1/2-day course is designed for control system administrators, process control engineers and IT specialist responsible for managing, installing, and commissioning a DeltaV system. This course includes access to a virtual DeltaV system to practice and review course workshops complete with brief recorded demonstrations available after course completion.

Topics
• Overview of system components and topologies
• DeltaV domain setup, including independent deltav domain controllers
• DeltaV installation procedures
• Licensing
• Import and export of configuration
• Firmware upgrades
• Controller health diagnostics
• User administration
• Configuration Database administration
• Creating additional workstations
• Auto Update services
• Continuous historian administration
• Advanced continuous historian administration
• Remote desktop services
• Event chronicle administration
• Network Time Protocol configuration/diagnostics
• Backup and restore procedures

Audience
This course is designed for control system administrators, process control engineers and IT specialist responsible for managing, installing, and commissioning a DeltaV system.

DeltaV - Administration - Virtual Course - 7027V
CEUs – 3.2

Overview
This 4-1/2-day course is designed for control system administrators, process control engineers and IT specialist responsible for managing, installing, and commissioning a DeltaV system. This course includes access to a virtual DeltaV system to practice and review course workshops complete with brief recorded demonstrations available after course completion.

Topics
• Overview of system components and topologies
• DeltaV domain setup, including independent deltav domain controllers
• DeltaV installation procedures
• Licensing
• Import and export of configuration
• Firmware upgrades
• Controller health diagnostics
• User administration
• Configuration Database administration
• Creating additional workstations
• Auto Update services
• Continuous historian administration
• Advanced continuous historian administration
• Remote desktop services
• Event chronicle administration
• Network Time Protocol configuration/diagnostics
• Backup and restore procedures

Audience
This course is designed for control system administrators, process control engineers and IT specialist responsible for managing, installing, and commissioning a DeltaV system.

DeltaV - Advanced Control - Virtual - 7201V
CEUs – 3.2

Overview
This 4-1/2-day course introduces students to the advanced control tools available within the DeltaV system and how they may be used to improve plant operations. The principal technology that is utilized in each product will be discussed. The areas of improvement that may be achieved will be detailed. Also, each student will gain hands on experience with these tools in class exercises based on realistic process simulations.

Topics
• The Control Foundation in DeltaV
• Traditional Tools e.g. Override, Cascade, Ratio
• Improvements Provided by Advanced Control
• DeltaV Inspect with InSight
• Detection of Abnormal Conditions
• Performance Indices
• Performance Reports
• DeltaV Tune with InSight
• Measurement of Process Dynamics
• Tuning Methods
• Tuning Response
• Process Learning
• Adaptive Tuning
• Adaptive Control
• DeltaV Fuzzy
• Principles of Fuzzy Logic Control
• FLC Function Block, Tuning
• DeltaV Predict
• MPC for Multi-Variable Control
• Model Identification, Data Screening
• Simulation of Response, Tuning
• DeltaV Neural
• Creation of Virtual Sensor
• Data Screening, Training
• DeltaV Simulate Suite
• Process Simulation
• Simulate Pro

Prerequisites
7009, DeltaV Implementation I or equivalent field experience.

Overview
This 4-1/2-day course is for process control engineers responsible for configuring graphics in the DeltaV Live operator interface. This course teaches basic options through advanced configuration topics.

Topics
- Graphics Studio
- Environment Customization
- DeltaV Live Administration
- Display Interactions
- Conversion Functions
- Class Based Graphical Element Modules (GEMs)
- Contextual Displays
- Custom Faceplates
- Pop Up pictures
- Forms
- Display Layout Configuration – Multi-Monitor Configuration
- Frame Customization
- Publishin
- Display Hierarchy
- Script Assistant
- Language Changes
- Theme GEMs
- Importing & Exporting Displays

Audience
This course is designed for process and process control engineers responsible for obtaining key production data, maintaining, configuring, and troubleshooting a DeltaV system with the DeltaV Live user interface.

DeltaV – Advanced Graphics – Using DeltaV Operate Interface - 7025 CEUs – 3.2

Overview
This 4-1/2-day course is for process control engineers responsible for configuring advanced functionality in the DeltaV user interface. This course expands on graphic topics covered in both the DeltaV Implementation, course 7009 and DeltaV Implementation II, course 7017.

Topics
- Visual Basic Primer
- Forms
- Modules
- Schedules
- User Preferences
- Picture Sizing
- Environment Customization
- Custom Faceplates
- Function Block Faceplates
- FRS Functions
- Pop Up Menus
- Color Threshold Tables
- Custom Dynamos
- Tag Groups
- Key Macro Editor
- Theme Dynamos

Audience
This course is for process control engineers responsible for configuring advanced functionality in the DeltaV user interface.

Prerequisites
Course 7009, DeltaV Implementation I

DeltaV - Advanced Graphics – Using DeltaV Operate Interface - Virtual - 7025V CEUs – 3.2

Overview
This 4-1/2-day course is for process control engineers responsible for configuring advanced functionality in the DeltaV user interface. This course expands on graphic topics covered in both the DeltaV Implementation course 7009 and DeltaV Implementation II course 7017.

Topics
- Visual Basic Primer
- Forms
- Modules
- Schedules
- User Preferences
- Picture Sizing
- Environment Customization
- Custom Faceplates
- Function Block Faceplates
- FRS Functions
- Pop Up Menus
- Color Threshold Tables
- Custom Dynamos
- Tag Groups
- Key Macro Editor
- Theme Dynamos

Audience
This course is for process control engineers responsible for configuring advanced functionality in the DeltaV user interface.

Prerequisites
Course 7009, DeltaV Implementation I

DeltaV - Analyze Features Training - e7045 CEUs - .20

Overview
This course is for personnel who will be using DeltaV Analyze in their alarm management program. This on-line course includes audio presentations, quizzes, and up to a four-hour access to DeltaV Analyze. To obtain hands on experience, e7045 students will have four-hour access to DeltaV Analyze over a two week time-frame.

Topics
- DeltaV Analyze Overview
- DeltaV Analyze Administration Features
- How to Create a Bookmark
- How to Create an Alarm Statistics Report

Course access is 12 months
DeltaV - Batch Analytics Model Builder -
e7046
CEUs - .80

Overview
This 8-hour (average duration) on-line course provides an orientation of Batch Analytics Model Builder. The course includes audio presentations, demonstrations, hands-on practices, hands-on workshops, and quizzes. Course access is 12 months. Upon completion of this course, the student will be able to:

- Define basic principles of Batch Data Analytics and their use in fault detection and quality parameter prediction
- Use the Batch Data Analytics Model Builder application to build and deploy a project for fault detection and quality parameter prediction
- Users will be able to recognize and navigate the screens needed to build a model in Batch Analytics
- Users need to define batch logic, stage logic, and initial condition logic needed for model development
- Users will be able to interpret analytic data of the Model Builder application using a saline example
- Users will be able to build a Batch Data Analytics model

Topics
- Batch Analytics Overview
- Batch Analytics Model Builder Overview
- Batch Analytics Viewer Overview
- Batch Saline Simulation
- Benefits of Using Batch Analytics
- Batch Analytics Manager Administration
- Batch Logic, Stage Logic, and Initial Logic Required to Build a Model
- Batch Analytics Model Builder – Equipment
- Batch Analytics Model Builder – Product
- Batch Analytics Model Builder – Model

Audience
This course is designed for Chemometricians, Process Engineers, Quality Engineers, and Process Control Engineers.

DeltaV - Batch Analytics Operator -
e7044
CEUs -.6

Overview
This 6-hour (average duration) on-line course provides an orientation of Batch Analytics and how it is used in a production environment. The course includes audio presentations, demonstrations, hands-on practices, hands-on workshops, and quizzes. Upon completion of this course, the student will be able to:

- Define basic principles of Batch Analytics
- Identify how Batch Analytics is used in fault detection and quality parameter prediction
- Identify the Batch List, Quality Prediction, and Fault Detection screens
- Monitor a fault
- Interpret analytic data of a saline example
- Identify the root cause of a detected fault

Topics
- Batch Analytics Overview
- Batch Analytics Model Builder Overview
- Batch Analytics Viewer Overview
- Batch Saline Simulation
- Benefits of Using Batch Analytics
- Batch Analytics Viewer – Batch List Tab
- Batch Analytics Viewer – Fault Detection Tab
- Batch Analytics Viewer – Quality Prediction

Audience
This course is designed for operators, process engineers, and management.

Prerequisites
DeltaV Batch experience and Microsoft Windows experience is required.

DeltaV - Communication Bus Interfaces w/the DeltaV System – 7037
CEUs – 2.5

Overview
This 3-1/2-day course covers the integration of fieldbus compliant devices using DeltaV systems. Upon completion of the course the student will be able to install, configure and verify proper operations of AS-1, Profibus DP, DeviceNet Serial, EtherNet IP, and Wireless HART® devices, including proper wiring practices. The AMS Intelligent Device Manager will be used to interrogate PROFIBUS DP and Wireless HART devices. The target audience usually does the following:

- Monitors alerts to preemptively address problems prior to operators seeing a problem in the control room
- Provides loop testing and assistance with instrumentation on plant turnarounds, startups, and for project work
- Improves process availability and reduces operations and maintenance costs

Topics
- Communication Bus Introduction
- AS-1 Overview
- AS-1 Wiring and Installation
- AS-1 Network with DeltaV
- PROFIBUS DP Overview
- PROFIBUS Wiring and Installation
- Configuring a PROFIBUS Segment
- Device Net Overview
- Device Net Diagnostics and Configuration
- Troubleshooting
- Serial Interface
- HART® Overview
- Ethernet I/O Overview
- Wireless I/O Overview

Audience
The hands-on workshops with DeltaV along with AMS Device Manager will address areas relating to the instrument technician’s daily tasks.

Prerequisites
7009 DeltaV Implementation I or 7018 DeltaV Hardware Installation and Troubleshooting.
DeltaV - Control - Advanced – 7201 CEUs – 3.2

Overview
This 4-1/2-day course introduces students to the advanced control tools available within the DeltaV system and how they may be used to improve plant operations. The principal technology that is utilized in each product will be discussed. The areas of improvement that may be achieved will be detailed. Also, each student will gain hands on experience with these tools in class exercises based on realistic process simulations.

Topics
- The Control Foundation in DeltaV
- Traditional Tools e.g. Override, Cascade, Ratio
- Improvements Provided by Advanced Control
- DeltaV Inspect with InSight
- Detection of Abnormal Conditions
- Performance Indices
- Performance Reports
- DeltaV Tune with InSight
- Measurement of Process Dynamics
- Tuning Methods
- Tuning Response
- Process Learning
- Adaptive Tuning
- Adaptive Control
- DeltaV Fuzzy
- Principles of Fuzzy Logic Control
- FLC Function Block, Tuning
- DeltaV Predict
- MPC for Multi-Variable Control
- Model Identification, Data Screening
- Simulation of Response, Tuning
- DeltaV Neural
- Creation of Virtual Sensor
- Data Screening, Training
- DeltaV Simulate Suite
- Process Simulation
- Simulate Pro

Prerequisites
7009, DeltaV implementation I or equivalent field experience.

DeltaV - Control Loop Foundation – 9025 CEUs – 3.2

Overview
This 4-1/2-day course for personnel new to automation and covers process control fundamentals as well as the practical aspects of control system design and applications. Upon completion of this course the student will be able to effectively understand and work with single and multi-loop control strategies. Interactive workshops allow the student to apply what they learn in the class.

Topics
- Background — Historic Perspective
- Measurements — Basic Transmitter Types, Limitations
- Analyzers — Examples of On-Line Analyzers
- Final Elements - Valves and Variable Speed Drives
- Field Wiring and Communications — Traditional, HART®, Foundation fieldbus, WirelessHART™
- Control Strategy Documentation — Plot Plan, Flow Sheet, P&ID, Loop Sheet
- Operator Graphics and Metrics — Considerations in Display Design
- Process Characterization — Identifying Process Dynamics and Gain
- Control Objectives
- Single Loop Control — Basis for PID, Guideline in Selecting PID Structure, Action
- Tuning and Loop Performance - Manual and Automated Tuning Techniques
- Multi-loop Control — Feedforward, Cascade, Override, Split-range, Valve Position Control
- Model Predictive Control — Addressing Difficult Dynamics, Interactive Processes
- Process Modeling — Development of Process Simulation for Control System Checkout
- Application Examples — Batch, Continuous, Combustion, Distillation, Unit Coordination

Audience
This course is for engineers, managers, technicians, and others that are new to process control. This course includes the practical aspects of control design and process applications that course developers personally learned through years of hands on experience while designing and commissioning process control applications.

Prerequisites
Windows experience.

DeltaV - Cybersecurity – 7026 CEUs – 3.2

Overview
The 4-1/2-day DeltaV Cybersecurity course focuses on the DeltaV Security Manual and the practical implementation of the guidance provided within. Students will engage in activities to properly apply Emerson’s Defense-in-Depth strategies so that students can have the skills to apply these same strategies on their DeltaV systems. Students are encouraged to read the DeltaV Security Manual before attending class.

Topics
DeltaV Deployment Guidelines & Physical Security
- Define the expected DeltaV installation environment
- Define physical access rules (cabinets, switches, consoles, etc.)

DeltaV Area Control Network
- Define proper network segmentation and topology rules
- Use DeltaV Firewall/IPD and Smart Switches
- Lock and protect embedded nodes

Communications Security & Remote Access to DeltaV
- Define communication and security requirements for remote access
- Use Emerson Smart Firewall
- Deploy Remote Desktop Gateway server
- Configure DeltaV remote desktop server

Active Directory Design & User Account Management
- Define Active Directory implementation guidelines
- Create customized DeltaV users and groups
- Audit user privileges
- Configure password policies through Group Policy Objects

Device Hardening & Event Logging
- Define device internal and interface protection rules
- Deploy DeltaV Endpoint protection and Application Whitelisting
- Configure Windows Firewall
- Create USB/Removable media Group Policy Object
- Configure syslog and other device logs to report to a System Information and Event Management (SIEM) appliance
- Configure DeltaV Network Security Monitoring appliance
DeltaV - Cybersecurity – 7026 – Continued...

- Use and customize SIEM dashboard to show system events

Software Patching
- Define how to obtain and install security patches
- Use Emerson’s Automated Patch Management solution

Backup & Recovery
- Define best practices and available technologies to backup critical data
- Use the DeltaV Backup & Recovery (Acronis) software

Audience
DeltaV System Administrators or IT personnel responsible for implementing DeltaV security

Prerequisites
7027

DeltaV - Cybersecurity – Virtual - 7026V – Continued...

- Configure DeltaV remote desktop server

Active Directory Design & User Account Management
- Define Active Directory implementation guidelines
- Create customized DeltaV users and groups
- Audit user privileges
- Configure password policies through Group Policy Objects

Device Hardening & Event Logging
- Define device internal and interface protection rules
- Deploy DeltaV Endpoint protection and Application Whitelisting
- Configure Windows Firewall
- Create USB/Removable media Group Policy Object
- Configure syslog and other device logs to report to a System Information and Event Management (SIEM) appliance
- Configure DeltaV Network Security Monitoring appliance
- Use and customize SIEM dashboard to show system events

Software Patching
- Define how to obtain and install security patches
- Use Emerson’s Automated Patch Management solution

Backup & Recovery
- Define best practices and available technologies to backup critical data
- Use the DeltaV Backup & Recovery (Acronis) software

Audience
DeltaV System Administrators or IT personnel responsible for implementing DeltaV security

Prerequisites
7027

DeltaV™ Essential Operator Training Solution

Overview
DeltaV™ Essential Operator Training Solution is an engineered, hands-on, customized learning environment to up-skill your operations workforce. Operators will learn DeltaV operating concepts using curriculum based on their specific displays as well as hands-on practice workshops relevant to their process.

The DeltaV Essential Operator Training Solution includes instructional materials, customized student curriculum, and workshops all customized to your specific graphics and module types. Student workshops include low fidelity tieback simulation to demonstrate module functionality and perform workshops.

DeltaV Essential Operator Training Solution is available in three delivery formats.
1) Traditional classroom with live instructors and equipment
2) Virtual classroom environment with live online instruction and DeltaV distributed control systems (DCS)
3) A new blended learning environment that uses state-of-the-art technologies to host training in the cloud.

For more information, contact your local Emerson sales office or visit:
www.emerson.com/education

DeltaV Deployment Guidelines & Physical Security
- Define the expected DeltaV installation environment
- Define physical access rules (cabinets, switches, consoles, etc.)

DeltaV Area Control Network
- Define proper network segmentation and topology rules
- Use DeltaV Firewall-IPD and Smart Switches
- Lock and protect embedded nodes

Communications Security & Remote Access to DeltaV
- Define communication and security requirements for remote access
- Use Emerson Smart Firewall Deploy Remote Desktop Gateway server

Active Directory Design & User Account Management
- Define Active Directory implementation guidelines
- Create customized DeltaV users and groups
- Audit user privileges
- Configure password policies through Group Policy Objects

Device Hardening & Event Logging
- Define device internal and interface protection rules
- Deploy DeltaV Endpoint protection and Application Whitelisting
- Configure Windows Firewall
- Create USB/Removable media Group Policy Object
- Configure syslog and other device logs to report to a System Information and Event Management (SIEM) appliance
- Configure DeltaV Network Security Monitoring appliance
- Use and customize SIEM dashboard to show system events

Software Patching
- Define how to obtain and install security patches
- Use Emerson’s Automated Patch Management solution

Backup & Recovery
- Define best practices and available technologies to backup critical data
- Use the DeltaV Backup & Recovery (Acronis) software

Audience
DeltaV System Administrators or IT personnel responsible for implementing DeltaV security

Prerequisites
7027
### DeltaV - Fieldbus Devices – 7030
**CEUs – 2.8**

**Overview**
This 4-day lecture/lab course provides maximum hands-on experience working with FOUNDATION™ fieldbus instruments such as: the FIELDVUE™ Digital Valve Controller, Rosemount Pressure and Temperature Transmitters. The student will use the DeltaV control system to commission fieldbus devices, assign foundation fieldbus function blocks to field devices, troubleshoot using diagnostics and AMS Device Manager to manipulate device parameters.

**Topics**
- DeltaV Saleable System Overview
- Macro Cycle Execution
- Fieldbus Function Blocks
- FIELDVUE™ Theory of Operation
- Transmitter Theory of Operation
- AMS Device Manager Methods
- Fieldbus Wiring Practices
- System Troubleshooting
- Accessing Fieldbus Devices
- Alarms and Alerts at DeltaV Workstations
- Segment Checkout Procedures
- Replace Wizard

**Audience**
This course is for individuals responsible for maintaining, troubleshooting, calibrating, and modifying FOUNDATION™ fieldbus device parameters.

**Prerequisites**
Course 7009, DeltaV Implementation I. or 7018, DeltaV Hardware Installation and Troubleshooting

### DeltaV - Fieldbus Systems & Devices – 7032
**CEUs – 2.8**

**Overview**
This 4-day lecture/lab course provides maximum hands-on experience working with FOUNDATION™ fieldbus instruments such as: the FIELDVUE™ Digital Valve Controller, Rosemount Pressure and Temperature Transmitters. The student will use the DeltaV control system to commission fieldbus devices, assign foundation fieldbus function blocks to field devices, troubleshoot using diagnostics and AMS Device Manager to manipulate device parameters.

**Topics**
- FOUNDATION™ fieldbus Overview
- Macro Cycle Execution
- Fieldbus Function Blocks
- Control Anywhere
- Fieldbus Wiring and Installation
- Segment Checkout Procedures
- Commissioning and Configuring Devices
- Control Strategy Configuration
- Configuring an Operator Display

**Audience**
This course is for individuals responsible for designing and configuring FOUNDATION™ fieldbus segments; as well as analyzing the fieldbus macro cycle, troubleshooting fieldbus segments/devices and modifying FOUNDATION™ fieldbus parameters.

**Prerequisites**
7009 DeltaV Implementation I or 7018 DeltaV Hardware Installation and Troubleshooting.

### DeltaV - Hardware & Troubleshooting – 7018
**CEUs – 2.8**

**Overview**
This course provides an overview of the DeltaV Control Network, M- and S-series hardware, and software applications. Upon completion, you will be familiar with the hard-ware and be able to perform troubleshooting techniques. This 4-day course focuses on the hardware components that make up the DeltaV system: M-series controllers and I/O, S-series controllers and I/O (including CHARMs), and DeltaV Smart Switches. Using a combination of lectures and workshops, you will learn how to use operator and diagnostic tools to identify and locate hard-ware-related fault conditions. Workshops provide the opportunity to disassemble and reassemble the M- and S-series hardware and return the system to an operating state. If your systems include bus technologies such as Foundation Fieldbus, we recommend courses 7030, 7032, or 7037. The 7018 course satisfies the prerequisite requirement for these bus course (except 7032)

**Topics**
- DeltaV Overview
- Operator Alarms
- DeltaV Diagnostics
- DeltaV Smart Switches
- DeltaV I/O Cards and Carriers
- Controllers and Power Supplies
- Electronic Marshalling (CHARMs)
- HART® I/O
- DeltaV and AMS Suite Intelligent Device Manager
- Redundant I/O

**Audience**
This course is recommended for instrumentation and maintenance technicians, managers, and configuration engineers who need to know about DeltaV hardware.

**Prerequisites**
Windows Experience
DeltaV - Implementation II – 7017
CEUs – 3.2

Overview
During the 4-1/2-day course, the student will be able to identify function block structures, interpret function block status values, design error masking, define nodes, and configure class-based control modules using the Command-Driven algorithm. This course includes access to a virtual DeltaV system to practice and review course workshops complete with brief recorded demonstrations available after course completion. Create custom faceplates and dynos, configure modules with analog control palette blocks and create simulation for test purposes. This course includes access to brief recorded demonstrations available after course completion, so students can review exercises completed in class.

Topics
• Function Block Structures & Status Values
• Analog Control Palette Blocks PID Bias/Gain, Dead time, Ratio, Signal Characterizer, Splitter
• HART® Inputs and Outputs
• HART Device Alarms
• Unit Alarms
• DeltaV Tune with InSight
• Device Control Options
• Class Based Control Modules
• Configuration of Equipment Modules for Supervisory Control
• Custom Faceplates and Dynamos

Audience
This course is for process control engineers responsible for designing, implementing and testing configuration using the DeltaV system.

Prerequisites
Course 7009, DeltaV Implementation I

DeltaV - Implementation II - Virtual - 7017V
CEUs – 3.2

Overview
During the 4-1/2-day course, the student will be able to identify function block structures, interpret function block status values, design error masking, define nodes, and configure class-based control modules using the Command-Driven algorithm. This course includes access to a virtual DeltaV system to practice and review course workshops complete with brief recorded demonstrations available after course completion.

Topics
• Function Block Structures & Status Values
• Analog Control Palette Blocks PID Bias/Gain, Dead time, Ratio, Signal Characterizer, Splitter
• HART® Inputs and Outputs
• HART Device Alarms
• Unit Alarms
• DeltaV Tune with InSight
• Device Control Options
• Class Based Control Modules
• Configuration of Equipment Modules for Supervisory Control
• Custom Faceplates and Dynamos

Audience
This course is for process control engineers responsible for designing, implementing and testing configuration using the DeltaV system.

Prerequisites
Course 7009, DeltaV Implementation I

DeltaV InSight – Virtual – 7201CV
CEUs – 0.7

Overview
This 1-day course introduces students to DeltaV InSight and how it may be used to improve the plant operations. The measurement of the process dynamics will be discussed, and the DeltaV Tune application will be introduced and used with Adaptive Tuning and Adaptive Control. Also, each student will gain hands on experience with these tools in class exercises based on realistic process simulations.

Topics
• DeltaV Tune with InSight
• Measurement of Process Dynamics
• Tuning Methods
• Tuning Response
• Process Learning
• Adaptive Tuning
• Adaptive Control
• DeltaV Inspect with InSight
• Detection of Abnormal Conditions
• Performance Indices
• Performance Reports

Prerequisites
7009, DeltaV Implementation I or equivalent field experience.
DeltaV – Control – Advanced – Custom - Virtual - 7203CV
CEUs – 3.2

Overview
This 4-1/2-day course is designed for process and control engineers who are applying DeltaV Predict and Predict Pro. This is a condensed course with selected content from Courses 7201 and 7202. It provides practical examples of how to determine the benefits of MPC application and how this control may be used to meet specific application requirements. Students will gain hands on experience through lab exercises based on realistic dynamic process simulations.

Topics
How to Implement an MPC Solution
- DeltaV MPC Function Blocks and Predict / Predict Pro
- MPC for Multi-Variable Control
- Model Identification, Data Screening
- Simulation of Response, Tuning

How to Justify an MPC Project
- Evaluating the Cost of Process Variation
- Estimating the Reduction in Variation that is possible using MPC
- Calculating the Benefit of Maximizing throughput when plant production is restricted by Input Limits or Measurable Constraint

Meeting Application Requirements
- Ensuring Disturbance Inputs are Independent of Other Process Inputs
- Meeting Control Requirements when the Response Times are Very Different
- Understanding the Design and Testing of an Integrating Process

Tailoring Control Performance
- Placing more Emphasis on Selected Control or Constraint Parameters
- Improving Control Performance when the Process is Dead time Dominant
- Compensating for Large Changes in Process Gain or Dynamics
- Minimizing the Impact of Process Noise on Control Performance

MPC Application
- Selecting and Applying MPC, MPC-Pro and MPC-Plus Blocks

Optimizing Control
- Optimizing the Control Using the MPC-Pro or MPC-Plus Blocks

Audience
This course is designed for process and control engineers who are applying DeltaV Predict and Predict Pro.

Prerequisites
7201 DeltaV Advanced Control

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DeltaV - Model Predictive Control – 7202
CEUs – 2.4

Overview
This 3-1/2-day course is designed for process and control engineers who are applying DeltaV Predict and Predict Pro. It provides practical examples of how to determine the benefits of MPC application and how this control may be used to meet specific application requirements. Students will gain hands on experience through lab exercises based on realistic dynamic process simulations.

Topics
How to Justify an MPC Project
- Evaluating the Cost of Process Variation
- Estimating the Reduction in Variation that is possible using MPC
- Calculating the Benefit of Maximizing throughput when plant production is restricted by Input Limits or Measurable Constraint

Meeting Application Requirements
- Meeting Control Requirements when the Response Times are Very Different
- Understanding the Design and Testing of an Integrating Process

Tailoring Control Performance
- Placing more Emphasis on Selected Control or Constraint Parameters
- Improving Control Performance when the Process is Dead time Dominant
- Compensating for Large Changes in Process Gain or Dynamics
- Minimizing the Impact of Process Noise on Control Performance

MPC Application
- Selecting and Applying MPC, MPC-Pro and MPC-Plus Blocks

Optimizing Control
- Optimizing the Control Using the MPC-Pro or MPC-Plus Blocks

Audience
This course is designed for process and control engineers who are applying DeltaV Predict and Predict Pro.

Prerequisites
7201 DeltaV Advanced Control

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DeltaV - Model Predictive Control - Virtual - 7202V
CEUs – 2.4

Overview
This 3-1/2-day course is designed for process and control engineers who are applying DeltaV Predict and Predict Pro. It provides practical examples of how to determine the benefits of MPC application and how this control may be used to meet specific application requirements. Students will gain hands on experience through lab exercises based on realistic dynamic process simulations.

Topics
How to Justify an MPC Project
- Evaluating the Cost of Process Variation
- Estimating the Reduction in Variation that is possible using MPC
- Calculating the Benefit of Maximizing throughput when plant production is restricted by Input Limits or Measurable Constraint

Meeting Application Requirements
- Meeting Control Requirements when the Response Times are Very Different
- Understanding the Design and Testing of an Integrating Process

Tailoring Control Performance
- Placing more Emphasis on Selected Control or Constraint Parameters
- Improving Control Performance when the Process is Dead time Dominant
- Compensating for Large Changes in Process Gain or Dynamics
- Minimizing the Impact of Process Noise on Control Performance

MPC Application
- Selecting and Applying MPC, MPC-Pro and MPC-Plus Blocks

Optimizing Control
- Optimizing the Control Using the MPC-Pro or MPC-Plus Blocks

Audience
This course is designed for process and control engineers who are applying DeltaV Predict and Predict Pro.

Prerequisites
7201 DeltaV Advanced Control
DeltaV - Operator (v11) for Continuous Operations - e7012
CEUs – 1.2

Overview
This interactive on-line course includes audio presentations, demonstrations, practice sessions, workshops, quizzes, and a final examination. The average time to complete the course is 12 hours.
Note: Course access is 12 months.

Topics
- System Overview; Accessing DeltaV Operate
- Navigating in DeltaV Operate
- Discrete, Analog, Regulatory, and Cascade Control Module Operation
- Motor Control Module Operation
- Accessing: Alarm Displays; Real-Time/Historical Trend Data; Process History View
- Using DeltaV Operate Themes

Audience
Operators, supervisors and managers responsible for the operation of continuous processes with a DeltaV System. Ideal students for this course are new to the DeltaV System but already have process control/plant experience.

DeltaV - Operator Interface for Batch – 7014
CEUs – 1.8

Overview
This 2-1/2-day course uses lectures and hands-on workshops to provide an in-depth overview on operating the DeltaV System. It includes all content in course 7012 plus students will:
- Understand basic batch terminology
- Manipulate Unit Module parameters
- Access the Batch Operator Interface
- Run procedures
- Review batch history data topics
- System Overview
- Accessing DeltaV Operate
- Window, Menus Displays and Directories
- Discrete, Analog, Regulatory and Cascade Control Module Operation
- Motor Control Module Operation
- Accessing Alarm Displays/Alarm Handling
- Accessing Real-time/Historical Trend Data
- Accessing Process History View
- Sequential Function Chart Operation
- Phase and Recipe Controls
- Batch Operator Interface
- Batch Historian
- Campaign Manager

Audience
This course is for operators, supervisors, and managers responsible for the operation of batch processes using DeltaV system.

DeltaV - Operator Interface for Batch - Virtual - 7014V
CEUs – 1.8

Overview
This 2-1/2-day course uses lectures and hands-on workshops to provide an in-depth overview on operating the DeltaV System. It includes all content in course 7012 plus students will:
- understand basic batch terminology
- manipulate Unit Module parameters
- access the Batch Operator Interface
- run procedures
- review batch history data

Topics
- System Overview
- Accessing DeltaV Operate
- Window, Menus Displays and Directories
- Discrete, Analog, Regulatory and Cascade Control Module Operation
- Motor Control Module Operation
- Accessing Alarm Displays/Alarm Handling
- Accessing Real-time/Historical Trend Data
- Accessing Process History View
- Sequential Function Chart Operation
- Phase and Recipe Controls
- Batch Operator Interface
- Batch Historian
- Campaign Manager

Audience
This course is for operators, supervisors, and managers responsible for the operation of batch processes using DeltaV system.
### DeltaV - Operator Training for Continuous Operation – 7012
#### CEUs – 1.4

**Overview**
This 2-day course uses lectures and hands-on workshops to provide an in-depth overview on operating the DeltaV System. Students who complete this course will:
- access operator displays
- manipulate various control module operating parameters to operate the process
- respond to process alarms
- monitor process performance
- view real-time and historical trend data

**Topics**
- System Overview
- Accessing DeltaV Operate Window, Menus Displays and Directories
- Discrete and Analog Control Module Operation
- Accessing Alarm Displays/Alarm Handling
- Motor Control Module Operation
- Regulatory/Cascade Control Module Operation
- Accessing Real-time/Historical Trend Data
- Unit Alarms
- Sequential Function Chart Operation
- Phase Logic Modules

**Audience**
This course is for operators, supervisors and managers responsible for the operation of continuous processes using DeltaV system.

### DeltaV - Operator Training for Continuous Operation - Virtual - 7012V
#### CEUs – 1.4

**Overview**
This 2-day course uses lectures and hands-on workshops to provide an in-depth overview on operating the DeltaV System. Students who complete this course will:
- access operator displays
- manipulate various control module operating parameters to operate the process
- respond to process alarms
- monitor process performance
- view real-time and historical trend data

**Topics**
- System Overview
- Accessing DeltaV Operate Window, Menus Displays and Directories
- Discrete and Analog Control Module Operation
- Accessing Alarm Displays/Alarm Handling
- Motor Control Module Operation
- Regulatory/Cascade Control Module Operation
- Accessing Real-time/Historical Trend Data
- Unit Alarms
- Sequential Function Chart Operation
- Phase Logic Modules

**Audience**
This course is for operators, supervisors and managers responsible for the operation of continuous processes using DeltaV system.

### DeltaV – PK Controller Overview – Blended – 7400B
#### CEUs – 0.6

**Overview**
This 6-hour blended course teaches students already familiar with DeltaV Configuration the required skills to install, configure, and maintain a PK controller. This course is a virtual PK Standalone Engineering station and virtual PK controller to complete the exercises. Recorded lecture and demonstrations provide students a detailed walkthrough of the PK Controller setup and configuration.

**Topics**
- PK Controller hardware overview
- IOP-3 port configuration options
- Supported I/O options
- Standalone Engineering workstation options
- Licensing
- PK Controller Administration
- Creating new projects
- Backup & Restore project information
- Using SD Card
- Configuring PK Controller IP address
- Comparing Backup vs. Project configurations
- Copying Projects
- Security setting – Lock configuration
- PK Merge Utility

**Audience**
This course is designed for process & process control engineers responsible for installing a nd mainitaining a PK controller standalone installation.

**Prerequisites**
Course 7009 and 7409 or equivalent DeltaV experience.

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### DeltaV - pH Control Solutions – 9060
#### CEUs – 1.0

Contact education@emerson.com or call 800-338-8158 for additional information.
DeltaV - PMO Configuration Standard (PCSD) – 7076
CEUs – 3.2

Overview:
This 4½ day course will introduce students to the PCSD structure and commonly used PCSD templates for analog, discrete and regulatory control. Students will also learn how to implement new DeltaV control modules using the PCSD library.

Upon completion of this course, the student will be able to:
• Modify existing control strategies while maintaining consistency with the PCSD library
• Add control strategies while maintaining consistency with the PCSD library

Topics:
Benefits of a structured approach to configuration
• PCSD Structure
• Operator graphics standards
• Configuration of the following using PCSD class-based modules:
  • Analog value reading and setting
  • Control of discrete devices
  • Loop control
  • Sequential control using Equipment Modules
• Modification of existing PCSD-based control configuration
• PCSD methods for:
  • Module arbitration
  • Mode locking
  • Mode, state and failure propagation
  • Inter-module interfacing
  • Interlocks, permissive and force set points

Audience:
This course is designed for engineers and technicians who maintain a DeltaV system configured using the PMO Configuration Standards for DeltaV (PCSD) library.

Prerequisites:
Course 7009, DeltaV Implementation I and familiarity with process control.

DeltaV - PMO Configuration Standard (PCSD) - Virtual - 7076V
CEUs – 3.2

Overview:
This 4½ day course will introduce students to the PCSD structure and commonly used PCSD templates for analog, discrete and regulatory control. Students will also learn how to implement new DeltaV control modules using the PCSD library.

Upon completion of this course, the student will be able to:
• Modify existing control strategies while maintaining consistency with the PCSD library
• Add control strategies while maintaining consistency with the PCSD library

Topics:
Benefits of a structured approach to configuration
• PCSD Structure
• Operator graphics standards
• Configuration of the following using PCSD class-based modules:
  • Analog value reading and setting
  • Control of discrete devices
  • Loop control
  • Sequential control using Equipment Modules
• Modification of existing PCSD-based control configuration
• PCSD methods for:
  • Module arbitration
  • Mode locking
  • Mode, state and failure propagation
  • Inter-module interfacing
  • Interlocks, permissive and force set points

Audience:
This course is designed for engineers and technicians who maintain a DeltaV system configured using the PMO Configuration Standards for DeltaV (PCSD) library.

Prerequisites:
Course 7009, DeltaV Implementation I and familiarity with process control.

DeltaV - Power and Grounding for Electronic Systems – 5590
CEUs – 1.4

Overview
This course focuses on specific power and grounding requirements of a control system. You will learn:
• how to conduct site verifications
• how to audit using “hands-on” testing labs
• to detect power and grounding problems on existing sites

Topics
• Review of Power Basics
• Power System Measurements
• Low Voltage Power Systems
• Power System Grounding
• Earthing vs. Grounding
• Connection to Earth
• Equipment Grounding
• Code Requirements
• Building Power Distribution
• Feeders and Branch Circuits
• Separately Derived Systems
• Power & Grounding for the DeltaV System
• Single Point Grounding
• Isolated Ground Installations
• Dedicated Circuits
• DC Grounding
• Verifying New Installations
• Power Quality Problems
• Applying Power Conditioning
• SIS Power and Grounding Installation
• Intrinsic Safety Devices

Audience
This 2-day course is designed for personnel involved with the planning, installation and maintenance of DeltaV digital automation system and provides essential knowledge regarding the power and grounding system for DeltaV equipment.

Prerequisites
A working knowledge of electronics and AC power basics is required.
### DeltaV Safety Instrumented System with SLS 1508 Maintenance – 7303
**CEUs – 2.1**

**Overview**
This 3-day course is a hands-on instructor-led course. The course covers the architecture of the DeltaV SIS including Rosemount SIS instruments and Fisher™ SIS Digital Valve Controllers. Students will gain a working knowledge of the hardware and software allowing them to troubleshoot and maintain the system.

**Topics**
- Safety Lifecycle
- DeltaV SIS Overview
- DeltaV SLS1508 Hardware
- Safety Instrumented Functions
- Rosemount SIS Instruments
- AMS Device Manager
- Fisher™ SIS Digital Valve Controller
- SISNet Repeaters

**Audience**
This course is for Electrical & Instrument technicians, maintenance technicians, E&I/reliability engineers and other personnel responsible for maintaining a DeltaV SIS SLS 1508.

**Prerequisites**
Course 7018, DeltaV Hardware and Troubleshooting, is a requirement.

### DeltaV - SIS Implementation – 7305
**CEUs – 3.2**

**Overview**
This 4 1/2-day course is a hands-on instructor led course. The course covers complete DeltaV SIS Implementation including hardware and software architecture. Students will be able to design a DeltaV SIS Network and Safety Instrumented Functions (SIFs). Additionally, students will be able to configure smart SIS instruments and their associated alerts, including partial stroke testing.

**Topics**
- DeltaV SIS Overview
- DeltaV SIS SLS 1508 Hardware Architecture
- DeltaV SIS with Electronic Marshalling Hardware Architecture
- DeltaV Safety Instrumented Functions
- Rosemount SIS Instruments
- AMS Device Manager relating to DeltaV SIS
- Fisher™ SIS Digital Valve Controllers
- SISNet Repeaters
- DeltaV SIS Security
- DeltaV Version Control
- Local Safety Network Bridges

**Audience**
This course is for personnel who design, implement, commission and service DeltaV SIS.

**Prerequisites**
Course 7009 is a requirement. Recommend IEC 61511 knowledge.

### DeltaV - SIS Implementation - Virtual - 7305V
**CEUs – 3.2**

**Overview**
This 4 1/2-day course is a hands-on instructor led course. The course covers complete DeltaV SIS Implementation including hardware and software architecture. Students will be able to design a DeltaV SIS Network and Safety Instrumented Functions (SIFs). Additionally, students will be able to configure smart SIS instruments and their associated alerts, including partial stroke testing.

**Topics**
- DeltaV SIS Overview
- DeltaV SIS SLS 1508 Hardware Architecture
- DeltaV SIS with Electronic Marshalling Hardware Architecture
- DeltaV Safety Instrumented Functions
- Rosemount SIS Instruments
- AMS Device Manager relating to DeltaV SIS
- Fisher™ SIS Digital Valve Controllers
- SISNet Repeaters
- DeltaV SIS Security
- DeltaV Version Control
- Local Safety Network Bridges

**Audience**
This course is for personnel who design, implement, commission and service DeltaV SIS.

**Prerequisites**
Course 7009 is a requirement. Recommend IEC 61511 knowledge.

Contact the registration office for class information at education@emerson.com or 800-338-8158.
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<tr>
<th>Course</th>
<th>CEUs</th>
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<tbody>
<tr>
<td>DeltaV - SIS with Electronic Marshalling Maintenance – 7304</td>
<td>2.1</td>
<td>Course 7018 DeltaV Hardware and Troubleshooting is a requirement.</td>
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<td><strong>Overview</strong></td>
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<td>This 3-day hands-on instructor led course covers the architecture of</td>
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<td>the DeltaV SIS with Electronic Marshalling including Rosemount SIS</td>
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<td>be able to identify the DeltaV SIS with Electronic Marshalling hardware</td>
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DeltaV - Using DeltaV Operate - Implementation I – 7009 CEUs – 3.2

Overview
During the 4-1/2-day course, the student will be able to define system capabilities, define nodes, configure continuous and sequential control strategies, create process alarms, operate the system, troubleshoot the system and modify operator displays. This course includes access to a virtual DeltaV system to practice and review course workshops complete with brief recorded demonstrations available after course completion.

Topics
- System Overview
- DeltaV Explorer
- DeltaV Diagnostics
- Control Modules
- Motor Control with Interlocking and Permissive Conditions
- Cascade Control
- Regulatory Control
- DeltaV Operate
- System Operation
- Alarms & Process History View
- Alarm Help
- Sequential Function Charts
- Configure Theme Dynamos
- Electronic Marshalling (CHARMS)

Audience
This course is designed for process & process control engineers responsible for obtaining key production data, maintaining, configuring and troubleshooting a DeltaV system.

Prerequisites
Microsoft Windows experience. Prospective attendees lacking process control experience should first attend Control Loop Foundation, Course 9025. Prospective attendees new to DeltaV should first attend PlantWeb/DeltaV Introduction, DeltaV Hardware & Troubleshooting, Course 7018.

DeltaV - Using DeltaV Operate - Implementation I - Virtual - 7009 CEUs – 3.2

Overview
During the 4-1/2-day course, the student will be able to define system capabilities, define nodes, configure continuous and sequential control strategies, create process alarms, operate the system, troubleshoot the system and modify operator displays. This course includes access to a virtual DeltaV system to practice and review course workshops complete with brief recorded demonstrations available after course completion.

Topics
- System Overview
- DeltaV Explorer
- DeltaV Diagnostics
- Control Modules
- Control Studio
- Motor Control with Interlocking and Permissive Conditions
- Cascade Control
- Regulatory Control
- DeltaV Operate
- System Operation
- Alarms & Process History View
- Alarm Help
- Sequential Function Charts
- Configure Theme Dynamos
- Electronic Marshalling (CHARMS)

Audience
This course is designed for process & process control engineers responsible for obtaining key production data, maintaining, configuring and troubleshooting a DeltaV system.

Prerequisites
Microsoft Windows experience. Prospective attendees lacking process control experience should first attend Control Loop Foundation, Course 9025.

DeltaV - Using DeltaV Live Operator Interface - Implementation I – 7409 CEUs – 3.2

Overview
During the 4-1/2-day course, the student will be able to define system capabilities, define nodes, configure continuous and sequential control strategies, create process alarms, operate the system, troubleshoot the system and modify operator displays using the DeltaV Live Operator Interface introduced with DeltaV Version 14.3. This course includes access to a virtual DeltaV system to practice and review course workshops complete with brief recorded demonstrations available after course completion.

Topics
- System Overview
- DeltaV Explorer
- DeltaV Diagnostics
- Control Modules
- Control Studio
- Motor Control with Interlocking and Permissive Conditions
- Cascade Control
- Regulatory Control
- DeltaV Live
- Graphics Studio
- System Operation
- Alarms & Process History View
- Alarm Help
- Sequential Function Charts
- Configure Theme Dynamos
- Electronic Marshalling (CHARMS)

Audience
This course is designed for process & process control engineers responsible for obtaining key production data, maintaining, configuring and troubleshooting a DeltaV system.

Prerequisites
Microsoft Windows experience. Prospective attendees lacking process control experience should first attend Control Loop Foundation, Course 9025.
### DeltaV - Using DeltaV Live Operator Interface - Implementation I - Virtual - 7409V

**CEUs – 3.2**

**Overview**

During the 4-1/2-day course, the student will be able to define system capabilities, define nodes, configure continuous and sequential control strategies, create process alarms, operate the system, troubleshoot the system and modify operator displays using the DeltaV Live Operator Interface introduced with DeltaV Version 14.3. This course includes access to a virtual DeltaV system to practice and review course workshops complete with brief recorded demonstrations available after course completion.

**Topics**

- System Overview
- DeltaV Explorer
- DeltaV Diagnostics
- Control Modules
- Control Studio
- Motor Control with Interlocking and Permissive Conditions
- Cascade Control
- Regulatory Control
- DeltaV Live
- Graphics Studio
- System Operation
- Alarms & Process History View
- Alarm Help
- Sequential Function Charts
- Configure Theme Dynamos
- Electronic Marshalling (CHARMS)

**Audience**

This course is designed for process & process control engineers responsible for obtaining key production data, maintaining, configuring and troubleshooting a DeltaV system.

**Prerequisites**

Microsoft Windows experience. Prospective attendees lacking process control experience should first attend Control Loop Foundation, Course 9025.

### DeltaV - Virtualization – 7029

**CEUs 3.2**

**Overview**

This 4-1/2-day course focuses on the installation, configuration and system administration of a virtualized DeltaV distributed control system. Using a combination of lectures and workshops, students will learn skill sets that enable them to properly plan, implement and maintain a robust DeltaV Virtual Studio (DVS) system intended for online (production) use. A key objective of this course is to prepare students for all aspects of owning a DVS system with special emphasis on providing highly available, reliable and secure access for end users of the DVS system.

**Topics**

- Virtualization Primer — Basics of How Virtualization Works
- Overview of DeltaV Virtualization Solutions
- Planning a DeltaV Virtual Studio System
- Installing and Configuring a VRTX Chassis and Blade Servers
- Creating DeltaV Virtual Machines including a ProfessionalPlus Node
- Configuring a WYSE or a Pepperl+Fuchs Thin Client and Redundant Thin Client Networks
- Create a Highly Available Failover Cluster
- Patching and Hardening of Cluster Nodes
- Cluster Health Monitoring and Troubleshooting
- Disaster Recovery and Replication
- Upgrading and Capacity Expansion

**Audience**

This course is designed for system administrators responsible for installing and maintaining DeltaV Workstations on a virtual platform.

**Prerequisites**

Course 7027, DeltaV Systems Administration for Windows 7 and Server 2008

### DeltaV - Virtualization Administration – 7028

**CEUs: 2.1**

**Overview**

This 3-day DeltaV Virtualization course focuses on the various software that is used in the management of a DeltaV Virtualization environment. Students will engage in workshops that will reinforce the material discussed to successfully run and maintain a Virtualized DeltaV system.

**Topics**

- Virtualization Hardware Setup
  - Overview of a typical virtualization system
  - Differences between a Host and DC Servers
  - Role of a DC
  - Networks within a virtualized system
  - Clusters
  - Virtual Networks
- Virtual Machines
  - Review templates
  - Process to create Virtual machines
  - Overview of classroom setup
  - Create additional DeltaV Workstations
- DeltaV Virtual Studio Tools
  - Grouping
  - VM Modifications
  - Edit Collection Settings
- Thin Clients
  - DeltaV Remote Desktop Connection (DRDC)
  - Redundant Thin Client Networks
- Replication & Disaster Recovery
  - Install/Configure Replication
  - Examine replication options
  - Recover from failovers
- Health Monitoring & Troubleshooting
  - Emerson SHM
  - DVS/Cluster Diagnostics
  - DeltaV Alarming
  - Failure Scenarios
- Host Patching & Moving VMs
  - Patching Procedures, Verification

**Audience**

This course is designed for system administration personnel that will be maintaining DeltaV workstations on a virtual platform after installation.

**Prerequisites**

7027 DeltaV System Administration
EIM™ Service Training Maintenance and Operation - Level I - VA111
CEUs - 2.8

Overview
This 4-day course presents a fundamental overview of the construction, assembly, hardware, software and configuration of EIM™ actuators. Students attending this program will demonstrate an ability to identify actuators, hardware, components and assemblies. All students will demonstrate the ability to setup, configure, check and verify operation of various actuator configurations using appropriate hardware or software.

Topics
- Actuator Basic Design and Power Transmission Fundamentals
- Basic Components and Assemblies of EIM™ Actuators
- Disassembly and Reassembly of EIM Series 2000 Actuators
- MCP:
  - Set Limit Switch and Torque Stop
  - Mechanical Disassembly (Basic)
  - Change Torque Springs
  - Identify Components in Package and understanding the Wiring Diagram and circuits
- M2CP:
  - Set Limit Switch and Torque Stop
  - Mechanical Disassembly (Basic)
  - Change Torque Springs
  - Identify Components in Package and understanding the Wiring Diagrams and circuits
- Tec2:
  - Set Limit Switch and Torque Stop
  - Mechanical Disassembly (Basic)
  - Change Torque Springs
  - Identify Components and interpret Wiring Diagram
  - Set Configuration Files
- TecLink & DCMLink™ Controls and Configuration Utilities
- Troubleshoot Settings via the Software
- RTS Actuator:
  - Set Limit Switch and Torque Stop
  - Identify Basic Components
  - Set Configuration
  - Understanding the Wiring Diagrams and available circuits
  - Application
  - Troubleshoot Start-up Problems Associated with Installation, Configuration and Operation of Various Control and Actuator Combinations

Prerequisites
Students planning on attending this program should have a minimum of 1 year field service experience and have a working knowledge of MS Windows. Each student should have a strong background in the mechanical operation and electrical operation of EIM™ products.

EIM™ Electric Actuator Service Training Maintenance and Operation - Level II - VA112
CEUs - 2.8

Overview
This 3-day course reviews the fundamental design and assembly construction, assembly, hard-ware, software and configuration of an EIM™ Electric Actuator. Students attending this program will demonstrate an ability to identify actuator hardware, components and assemblies. Students will interconnect various control configurations for applications of the actuators and prove actuator operation. All students will demonstrate the ability to setup, configure, check and verify operation of various actuator configurations using appropriate hardware or software.

Topics
- Identify the Basic Components and Assemblies of an EIM™ Actuator by
  Function, Configuration and Operation
- Common Service Activity Procedures for repair or upgrade of an EIM™ Series 2000 Actuator
- Demonstrate How to Upgrade/Convert a Tec2000 to TEC2 Controls. Actuator Configuration of an EIM™ Actuator
- Application and Wiring Options
- Interpreting/understanding the Wiring Diagram and Circuits
- Troubleshoot Start-up Problems Associated with Installation, Configuration and Operation of Various Control and Actuator Combinations

Prerequisites
Students planning on attending this program should have a minimum of 3 years field service experience and have previously attended the Service Training Program — Level I and have a working knowledge of MS Windows. Each student MUST have a strong background in the mechanical operation and electrical operation of EIM™ products. Other attendees with a solid background in electrical controls [including microprocessor basics] are encouraged to attend.

EIM™ Products - VA113
CEUs – 2.8

Overview
This 4-day course presents the fundamental aspects of EIM™ actuators, focusing on EIM™ Series 2000, TEC, RTS, and HQ. Attendees are presented with fundamental of design and operation and how they operate valves. Basic components and assemblies are identified to aid in understanding the basic controls, applications, and mechanical operation. Each student will learn how to set travel limits, torque limits and operate an actuator on or off the valve. Model number interpretation, document relevance (Spec Sheet; Manuals; W/Ds; Outlines; Assembly Drawings) and Support Resources will be discussed. How to identify and order parts from local distributors. Control Package wiring diagram interpretation and basic maintenance are all presented in a combination hands-on / instructor led lecture format. Any original course documentation and certificates are provided to all attendees for company records at the end of the program.

Topics
- Actuator Basic Design and Power Transmission Fundamentals of EIM™ Actuators
- Multi-Turn Valve and Part Turn Valve Applications
- Component Identification and function
- Identify EIM™ Control Types
- Interpreting/understanding the Controls and Wiring Diagram
- Demonstrate the Correct Method to Set Position and Torque Limits:
  - Multi-Turn Valve and Part Turn Valve
- Demonstrate the operation of various controls
- Basic Maintenance Associated with Reliable Actuator Performance

Prerequisites
Students should be involved with the application, marketing, sales or associated with service/maintenance of EIM™ products.
EIM™ RTS Electric Actuator Product and Service - VA123
CEUs – 2.4

Overview
This 3-day course presents the fundamental aspects of RTS actuators. Attendees are presented with essentials of design and operation and how they operate the valves. Basic components and assemblies are identified to aid in understanding the basic controls, applications, and mechanical operation. Each student will learn how to set travel limits, torque limits and operate an actuator on or off the valve. Model number interpretation, document relevance (Spec Sheet; Manuals; Wiring Diagrams; Outlines; Assembly Drawing) and support resources will be discussed. How to identify and order parts from local distributors or online store. Control Package wiring diagram interpretation and basic maintenance are all presented in a combination hands-on / instructor led lecture format. Any original course documentation and certificates are provided to all attendees for company records at the end of the program.

Topics
• Fail-Safe Operational Theory
• Mechanical assemblies for all RTS platforms CM - CL - FL – FQ.
• Detailed focus on Ball Screw assemblies & Spring Canisters.
• Detailed focus on both Brake (Fail-Safe & Spring Damping) assemblies.
• Focus on optional Hand-Wheel override assemblies.
• Electronic Board Sets: Logic Board – VFD – Encoder – Motor / location, function, functionality.
• Programming / Set-Up including Speed Controls both (pulsing & non-pulsing) speed changes. Binary Inputs / outputs.
• Alarm function code identification & clearing.
• Schiebel Smart Tool II Training

Audience
Repair techs of end users, LBP’s, distributors, Final Control Lifecycles Service techs, etc.

Prerequisite
It is recommended that students bring an android device for Smart Tool AppTraining. A dongle is required for IRDA communication. A single demo device is available for the training.
Overview
This 3-day class provides information on the ranges of pneumatic and electric actuators and accessories available from El-O-Matic™. Detailed information on electric actuator module boards/bus communication options will be addressed.

Topics
- Electric Actuator Series (ELS/EL.ELD & ELQ)
  - Identification of Components;
  - Basic Bench Testing;
  - Installation Options;
  - Actuator Sizing/Selection;
  - Control Options;
  - Hands-on Training Covering Installation of Module Boards for Different Control Functionality;
  - Bus Communication Options
- El-O-Matic™ Sizing Program
- Pneumatic Actuator F, E & P Series
  - History;
  - Identification of Components;
  - Comparison of F, E & P Series Actuators;
  - 180° Rotation Actuators;
  - Actuator Sizing/Selection;
  - Available Accessories;
  - Hands-on Training Including: Spring Changes, Seal Changes, Travel Stop Adjustment and Mounting of Accessories;
  - El-O-Matic™ Sizing
- QA Systems, Functions, RMA’s and Customer Complaint Handling

Prerequisite
Students should be involved with the application, marketing, sales or service/maintenance of El-O-Matic™ products.
Overview
Applied Modern Loop Tuning (9032) is a 3-day training course that introduces participants to effective methods for determining optimal tuning parameters for regulation of processes. The non-oscillatory EnTech tuning techniques, based on Lambda tuning concepts, are taught with a focus on minimizing process variability. Effectiveness is gained by the implementation of a tuning strategy that matches control loop dynamics to process operating requirements. It contains formal lectures that are amply populated with process examples and supported with hands-on lab exercises using high-fidelity process simulator software. Participants learn how to recognize acceptable versus unacceptable control loop performance and to identify the most common source of problems. Fundamental tuning concepts, including the PID controller, process dynamics, valve motion characteristics dead band (backlash) and resolution (stick/slip), set point tracking and regulatory control, integrating processes, and level control are reviewed and demonstrated using case study examples.

Topics
- Process Dynamics and Process Model Identification
- Open loop and Closed Loop Bump Tests Process Response — 1st and 2nd Order Self-Regulating Process and Integrating Process
- Process Model — Process Gain, Process Dead time and Process Time Constant
- Control Resolution and Valve Non-Linearity
- PID Forms and Structures
- Tuning Methods — Ziegler Nichols (QAD) and Model Based Lambda Tuning
- Self-Regulating process - Closed Loop Set point and Load Response Tuning
- Process variable Signal Filtering Integrating Process — Closed Loop Set point and Load Response Tuning
- Cascade Control Tuning
- Interactive Control Loops — Decoupling Control
- High-Fidelity Process Simulator Software - Engage Students in Hands-On Learning

Audience
This course is for engineers and technicians responsible for maintaining process control performance using instrumentation and control loop tuning.

Prerequisite
Some experience with process instrumentation and control is helpful.

Overview
EnTech Applied Advanced Regulatory Controls (9034) is a 3-day course that teaches the practical principals of advanced regulatory controls and tuning techniques to achieve improvements that can exceed that of basic PID controls. The course will examine many advanced regulatory control technologies commonly available today and help participants understand which technologies are best suited and how to appropriately apply them given specific process dynamics and conditions.

Formal lectures are amply populated with process examples and supported with hands-on lab exercises. Approximately 40% of the course is hands-on lab based workshops where students develop practical skills required to apply and tune advanced regulatory controls. A dynamic process simulator is used to simulate a variety of process unit dynamics and evaluate the benefits of different advanced regulatory control strategies.

Topics
- Process and Disturbance Dynamics
- PID Algorithms — PID, PI, PI-D, I-PD, PD, P-D, ID, I-D, 2 degrees of freedom control
- Cascade Control, Dynamic Feedforward
- Ratio Control, Override (selector) Control
- Split Range and Midrange Control
- Interactive Control Loops – Decoupling Control (2X2) and Lambda Tuning
- Deadtime Compensation (Smith Predictor)
- Adaptive Control (Gain Scheduling, Auto Tuning)
- Introduction to Model Predictive Control (Multiple Inputs Single Output)

Audience
This course is for engineers and technicians responsible for process control design, implementation, and control performance.

Prerequisite
Participants should possess basic process control knowledge.

Overview
This is a special combined 9032 and 9034 4-day course that teaches the practical principals of advanced regulatory controls and tuning techniques to achieve improvements that can exceed that of basic PID controls.

Formal lectures are amply populated with process examples and supported with hands-on lab exercises. Approximately 40% of the course is hands-on lab based workshops where students develop practical skills required to apply and tune advanced regulatory controls. A dynamic process simulator is used to simulate a variety of process unit dynamics and evaluate the benefits of different advanced regulatory control strategies.

Topics
- Process Dynamics and Process Model Identification
- Open loop and Closed loop bump tests
- Process Response – 1st and 2nd order self-regulating process and integrating process
- Process Model – process gain, process deadtime and process time constant
- Control resolution and valve non-linearity
- PID forms and structures
- Tuning Methods – Ziegler Nichols (quarter amplitude dampening) & model based Lambda Tuning
- Self-Regulating process - Closed loop setpoint and load response tuning
- Process variable signal filtering
- Integrating process – Closed loop setpoint and load response tuning
- Cascade control tuning
- Interactive control loops – decoupling control
- Dynamic Feedforward control – identification of process dynamics and feedforward tuning
- Deadtime Compensator – Smith Predictor deadtime compensator control versus PID
- PID Algorithms – PID, PI, PI-D, I-PD, PD, P-D, ID, I-D, 2 degrees of freedom control
- Simulator Labs – high fidelity simulator exercises engage students in Lambda tuning analysis
EnTech - Applied Modern Loop Training & Advanced Regulatory Controls – 9035

Audience
This course is for engineers and technicians responsible for process control design, implementation, and control performance.

Prerequisite
Participants should possess basic process control knowledge.

EnTech - Process Dynamics & Tuning Fundamentals – (PCE I) – 9030

Overview
EnTech Process Dynamics, Control and Tuning Fundamentals (Process Control for Engineers I) is a 4-day course that provides the fundamental theory governing process dynamic behavior, control system operation and controller tuning. Course material is based on experience gained in process variability optimization work and is based on modern control engineering concepts coupled with practical process application knowledge. This course presents a systematic approach to optimizing the control of a process unit in order to manufacture uniform product more efficiently. The course uses formal lectures with hands-on lab exercises. High fidelity process simulators are used as the basis for the labs and simulation analysis.

Topics
- Process Dynamics - Self Regulating and Integrating process
- Identify Process Model parameters – process gain, process deadtime and process time constant
- Develop simple linear transfer function dynamic models of 1st Order, 2nd Order and Integrating process
- Examine various sources of nonlinearity arising from equipment, instrumentation (valves) and process itself
- Control resolution and valve non-linearity
- Mathematical models of PID controller – PID forms, structures and tuning parameters
- Tuning methods – from Ziegler Nichols (quarter amplitude dampening), to Cohen-Coons (reactive curve) to Lambda tuning (Internal Model Control)
- Self-regulating process dynamics – tuning 1st Order and 2nd Order process loops
- Stability analysis – root locus, gain margin and phase margin analysis
- Frequency analysis – evaluate dynamic system performance, bode plots and minimum variance control

EnTech - Process Dynamics & Tuning Fundamentals – (PCE I) – 9030 – Continued...

- Closed loop setpoint and load response
- Integrating process dynamics – tuning level controls
- Interactive Control Loops – decoupling control
- Coordinated Lambda Tuning for Unit Optimization
- Control Loop Tuning using EnTech Toolkit Tuner module – Lambda tuning
- Simulator Labs – high fidelity simulator exercises engage students in Lambda tuning analysis

Audience
This course is for engineers, or persons with equivalent math and theoretical background, who have responsibility for process control design and implementation, process optimization or process design and troubleshooting.

Prerequisite
An engineering degree or equivalent knowledge and functionality in the mathematics required to understand the concepts listed in "topics".

EnTech - Process Analysis & Minimizing Variability - (PCEII) – 9031

Overview
EnTech Process Analysis and Minimizing Variability (9031 Process Control for Engineers II) is a 4-day course that provides knowledge of the techniques used to troubleshoot process and control problems, improve performance and reduce variability in processes. Time series analysis, including power spectrum and auto/cross correlation functions, are presented as tools for process and control performance evaluation. The course uses formal lectures that are highlighted with an ample repertoire of process examples and hands-on lab exercises. High fidelity process simulators are used as the basis for the labs and situation analyses.

 Topics
- Review - topics presented in 9030 Process Dynamics, Control and Tuning Fundamentals
- Use of EnTech Toolkit Tuner module for Identification of Process Dynamics, Lambda Tuning, Time Series Analysis
- Controller Tuning Troubleshooting - Dynamic Loop Interaction Problems
- Digital Control - Digital Controllers and Digital Sensors
- Signal Quantization, Signal Aliasing and Signal Filtering

Audience
This course is for engineers, or persons with equivalent math and theoretical background, who have responsibility for process control design and implementation, process optimization, instrumentation engineering, or process design and troubleshooting.

Prerequisite
Participants should have taken 9030 Process Dynamics, Control and Tuning Fundamentals (Process Control for Engineers I) or have similar knowledge.
EnTech - Process Troubleshooting and Optimization for the Control Performance Specialist – 9036
CEUs – 2.8

Overview
This 4-day course starts with the tools and techniques that were developed in 9032, but applies them to a methodical approach to process troubleshooting. The focus is on process variability: what it is, how it is measured, how it propagates through the process, how it can be identified and how it can be reduced. The tools available on the DCS as well as specialized tools (EnTech Toolkit) are studied to see how they help in identifying sources of process variability and the components of process improvement programs (Process design, control equipment design, control strategy design and tuning design) are studied in context of the process objectives. The focus is on process variability: what it is, how it is measured, how it propagates through the process, how it can be identified and how it can be reduced. The tools available on the DCS as well as specialized tools (EnTech Toolkit) are studied to see how they help in identifying sources of process variability and the components of process improvement programs (Process design, control equipment design, control strategy design and tuning design) are studied in context of the process objectives.

Topics
- Review of Process Dynamics
- Review of Feedback Control and PID Controllers
- Properties of Process and Product Variability
- Tools to measure Process variability
- Reducing variability through process control
- Dealing with non-linearities
- Troubleshooting using trends, statistics, auto / manual runs and bump tests
- Troubleshoot using Power Spectrum and Cross Correlation and EnTech’s Analyze Process Objectives
- Reducing variability by process design and by tuning strategy
- Reducing Variability by Control element design
- Reducing Variability by Control strategy design

Audience
This course is for engineers and technicians who are process control or control performance specialists
Prerequisite: 9032- EnTech Applied Modern Loop Tuning

Prerequisite
Participants should have an understanding of instrumentation and basic knowledge of process control.

EnTech - Toolkit Training – 1430
CEUs – 2.1

Overview
This is a 3-day course that fully explores the various functions, options and capabilities that are built into the EnTech Toolkit software. The course starts with the data acquisition features of the Collect module as it is connected to field instrumentation or directly to digital systems. The power of the Analyzes time series analysis software for process trouble-shooting, auditing and reporting on performance is examined using process simulators. The Tuner module includes bump test analysis, calculation of controller tuning parameters, and simulation of controller response characteristics. Participants are asked to perform process audits and report on their findings and the improvements they make.

Audience
This course is for engineers, technicians or other persons who have responsibility for using the EnTech Toolkit as part of their role in process troubleshooting, minimizing variability, and improving or maintaining performance of operations.
FieldQ™ Products - VA110
CEUs – 2.0

Overview
This 3-day class provides the knowledge required for the student to understand, troubleshoot and even repair the Valve Automation FieldQ™ actuator and modules. The class covers the full range of the actuators and the modules used to interface to the actuator. Classes are held periodically but can be tailored to fit specific needs of the students in attendance.

Topics
- Basic Product Overview
  - Actuator
  - Control Modules
- Introduction to Actuators
  - Rack & Pinion Operation
  - FieldQ™ Features/Benefits
  - Data Sheets
- Introduction to Modules
- General Features and Benefits, Types, Construction, Functionality
  - Hands on
- Field Topics
  - Installation
  - Maintenance
  - Troubleshooting
- Sales Training
  - Applications
  - Pricing
  - Configurations
- QA Systems, Functions, RMA s and Customer Complaint Handling

Prerequisite
Students should be involved with the purchase, application, marketing, sales, or service/maintenance of the FieldQ™ Actuation System.
Fisher™ - Control Valve - Fundamentals - e1500
CEUs - .4

Overview
This curriculum contains e1500, e1501, e1502, and e1503 - the course group introduces the basic terminology of control devices: including control valve types, uses, roles, flow characteristics and to the various entities that define codes and standards for control devices. Sliding stem, rotary, and the basics of an actuator, lists the types of actuators for sliding stem and rotary control valves, states the general components of an actuator and lists general actuator selection guidelines.

Fisher™ - Control Valve – Basics e1500
CEU’s - .1

Overview
This course introduces the basic terminology of control devices: including control valves types, uses, roles, flow characteristics and the various entities that define codes and standards for control devices.

Fisher™ - Sliding Stem Control Valve - Basics - e1501
CEUs - .1

Overview
This course introduces the basic definition of sliding stem control valves, types of sliding stem valves, their common components, guiding methods, typical uses, flow characteristics, the general sizing capacity and selection guidelines.

Fisher™ - Rotary Control Valve - Basics - e1502
CEUs - .1

Overview
This course introduces the basic definition of rotary control valves, defines the body types and styles of rotary valves, as well as their common components, flow characteristics and considerations, and finally the general sizing capacity and selection guidelines.

Fisher™ - Actuator - Basics - e1503

Overview
This course introduces the basic definition of an actuator, lists the types of actuators for sliding stem and rotary control valves, states the general components of an actuator and lists the general actuator selection guidelines.

Fisher™ - Control Valve Engineering I – 1300
CEUs – 2.1

Overview
This 3-day course reviews design and operating principles of control valves, actuators, positioners and related accessories. It describes the sizing and selection methods for a broad variety of control valves assemblies. Students who complete this course will:
- Select the proper valve characteristic for a given process
- Choose suitable styles of control valves for an application
- Size control valves and actuators
- Properly apply positioners and instruments

Topics
- Control valve selection: rotary/sliding stem
- Actuator selection and sizing
- Liquid valve sizing
- Gas valve sizing
- Positioners and transducers
- Valve guidelines
- Valve characteristics
- Valve packing considerations

Delivery Options
This training is also available as an Instructor Led course 1300.

Audience
This course is specifically tailored to engineers, technicians and others responsible for the selection, sizing, and application of control valve assemblies.

Prerequisites
Some experience with industrial control equipment including control valves and actuators would be helpful.
**Fisher™ - Control Valve Engineering II - 1325V**
**CEUs - .8**

**Overview**
This 8-hour remote virtual classroom course event consists of 2 virtual classroom part, 4 hours for each part. It reviews design and operating principles of control valves in various applications. It describes the sizing and selection methods utilized in selecting appropriate control valve assemblies, as they relate to severe service applications such as noise and cavitation. Students will solve several advanced sizing and selection problems using Fisher Specification Manager software and published materials. Students will also have the opportunity to ask Emerson certified instructors for Fisher engineering courses to clarify questions and assist in better understanding of these advanced fluid mechanic ideas. Students who successfully complete this course will:
- Size control valves and trim for a cavitation application
- Size control valves and trim for a noisy application
- Choose suitable styles of control valves for an application
- Size control valves for an erosive and/or corrosive application
- Properly apply knowledge learned from 1300 or 1300V

**Topics**
- Cavitation and flashing
- Noise
- Corrosion
- Erosion
- Valve application guidelines

**Audience**
This course is designed for engineers, technicians and others responsible for the selection, sizing, and application of control valve assemblies.

**Prerequisites**
Successful completion of 1300V or 1300 is required. Familiarity with sizing, selection, and advanced applications of control valves is strongly encouraged.

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**Fisher™ - Control Valve Engineering III – 1350**
**CEUs – 2.1**

**Overview**
This 3-day course reviews advanced application-specific design and operating principles of control valve assemblies, instruments, and accessories installed in a variety of non-general service applications. Students will gain insight in sizing and selection methods utilized in selecting appropriate control valve assemblies, as they relate to advanced control topics. Fisher Specification Manager software, combined with published reference materials, will be used to solve several advanced sizing and selection problems. Students will also have the opportunity to ask Emerson certified Fisher engineering instructors clarifying questions to firmly understand the advanced fluid mechanics covered in this course. Students who successfully complete the course will:
- Properly apply knowledge learned from 1300/1300V and 1325V
- Review basic sizing of control valves and build on the complexity of applications
- Review basics of thermodynamics and how those concepts relate to the sizing model
- Discuss key ideas involving cryogenic control valve assembly applications
- Size and select control valves for two-phase flow of hydrocarbon mixtures and dissolved gas
- Size and select actuators and pneumatic accessories for stroking speed requirements
- Gain insight into instrument diagnostics and optimum loop performance
- Learn the basics of steam conditioning processes and associated equipment

**Topics**
- Cavitation and flashing
- Noise
- Basic thermodynamics
- Cryogenic valves
- Two-phase flow
- Stroking speed
- Steam conditioning
- Control valve optimum loop performance
- Control Valve Diagnostic Basics

**Delivery Options**
This training is also available as a remote virtual classroom course 1350V.

**Audience**
This course is specifically tailored to technicians, engineers and others responsible for the proper selection, sizing, and application of control valve assemblies.

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**Fisher™ - Control Valve Engineering III – 1350 – Continued...**

**Prerequisites**
Successful completion of 1300 or 1300V and 1325V is required. Familiarity with sizing, selection, and advanced application of control valves is strongly encouraged.

**Fisher™ - Control Valve Engineering III-1350V**
**CEUs – 1.6**

**Overview**
This 16-hour remote virtual classroom course event consists of 4 virtual classroom part, 4-hour for each part. It reviews advanced application-specific design and operating principles of control valve assemblies, instruments, and accessories installed in a variety of non-general service applications. Students will gain insight in sizing and selection methods utilized in selecting appropriate control valve assemblies, as they relate to advanced control topics. Fisher Specification Manager software, combined with published reference materials, will be used to solve several advanced sizing and selection problems. Students will also have the opportunity to ask Emerson certified Fisher engineering instructors clarifying questions to firmly understand the advanced fluid mechanics covered in this course. Students who successfully complete the course will:
- Properly apply knowledge learned from 1300 or 1300V and 1325V
- Review basic sizing of control valves and build on the complexity of applications
- Review basics of thermodynamics and how those concepts relate to the sizing model
- Discuss key ideas involving cryogenic control valve assembly applications
- Size and select control valves for two-phase flow of hydrocarbon mixtures and dissolved gas
- Size and select actuators and pneumatic accessories for stroking speed requirements
- Gain insight into instrument diagnostics and optimum loop performance
- Learn the basics of steam conditioning processes and associated equipment

**Topics**
- Cavitation and flashing
- Noise
- Basic thermodynamics
- Cryogenic valves
- Two-phase flow
- Stroking speed
- Steam conditioning
- Control valve optimum loop performance
- Control Valve Diagnostic Basics
Fisher™ - Control Valve Engineering III-1350V – Continued…

Delivery Options
This training is also available as an Instructor Led course 1350.

Audience
It is specifically tailored to technicians, engineers and others responsible for the proper selection, sizing, and application of control valve assemblies.

Prerequisites
Successful completion of 1300 or 1300V and 1325V is required. Familiarity with sizing, selection, and advanced application of control valves is strongly encouraged.

Fisher™ - Valve Trim & Body Maintenance - 1400
CEUs – 2.1

Overview
This 3-day course and hands-on workshop explains how valves and actuators function and how they are installed and calibrated. It emphasizes installation, troubleshooting, parts replacement, and calibration of control valves, actuators, and FIELDVUE™ digital valve controllers. Those who complete this course will be able to:
- Correctly perform installation procedures
- Perform basic troubleshooting
- Properly apply and calibrate Fisher FIELDVUE DVC6200 digital valve controllers
- Change valve trim, gaskets and packing
- Valve characteristics

Topics
- Control valve terminology
- Globe valves
- Packing
- Actuators, and digital valve controllers
- Bench set
- Seat leak testing
- Ball valves
- Butterfly valves
- Eccentric disc valves

Delivery Options
This training is also available as a remote virtual classroom course 1400V.

Audience
This introductory course is for valve mechanics, maintenance personnel, instrument technicians, and others who are responsible for maintaining control valves, actuators and control valve instrumentation.

Prerequisites
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.

Fisher™ - Valve Trim & Body Maintenance – 1400V
CEUs – 1.0

Overview
This 10-hour remote virtual classroom course event consists of 5 virtual classroom parts, 2 hours for each part. It explains how valves and actuators function and how they are installed and calibrated. It emphasizes installation, troubleshooting, parts replacement, and calibration of control valves, actuators, and FIELDVUE™ digital valve controllers. Students also have the option to attend a corresponding hands-on workshop, 1401W, following the completion of the virtual classroom portion of this course. Students who complete this course will be able to:
- Correctly perform installation procedures
- Perform basic troubleshooting
- Properly apply and calibrate Fisher FIELDVUE DVC6200 digital valve controllers
- Change valve trim, gaskets and packing

Topics
- Control valve terminology
- Globe valves
- Packing
- Actuators, and digital valve controllers
- Bench set
- Seat leak testing
- Ball valves
- Butterfly valves
- Eccentric disc valves

Delivery Options
This training is also available as an Instructor Led course 1400.

Audience
This introductory course is for valve mechanics, maintenance personnel, instrument technicians, and others who are responsible for maintaining control valves, actuators and control valve instrumentation.

Prerequisites
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.

Fisher™ - Valve Trim & Body Maintenance Hands-on Workshop–1400W
CEUs – .8

Overview
This 8-hour workshop is offered as an optional component following the 1400V remote virtual classroom event. Students will have the opportunity to perform hands on exercises on control valve bodies and actuators that reinforce the maintenance topics that were discussed during the online portion of the course. The workshop is hosted in Marshalltown, IA and a workshop facilitator will be present to assist the students with any questions they may have while performing the exercises.

Workshops
- Fisher easy-e™- valve trim maintenance and repair
- Fisher sliding stem valve packing replacement
- Fisher Sliding stem actuator maintenance and repair
- Fisher 657 and 667 actuator bench set
- Fisher butterfly valve maintenance and repair
- Fisher ball valve maintenance and repair
- Fisher eccentric plug valve maintenance and repair
- Fisher rotary shaft valve packing replacement
- Fisher rotary actuator maintenance and repair
- Fisher rotary valve and actuator mounting

Audience
This workshop is intended for any students that have completed the online component of the 1400V course and would like to gain some hands-on experience working with the control valve assemblies.

Prerequisites
Must have successfully completed the 1400V course.
Fisher™ – Baumann™ Valve Technician - 1402
CEUs – 2.1

Overview
This 3-day course and hands-on workshop explains how Baumann valves and actuators function and how they are installed and calibrated. It emphasizes installation, troubleshooting, parts replacement, and calibration of control valves, actuators, positioners and FIELDVUE™ digital valve controllers. Those who complete this course will be able to:
• Correctly perform installation procedures
• Perform basic troubleshooting
• Properly apply and calibrate positioners and Fisher FIELDVUE digital valve controllers
• Change valve trim, gaskets and packing
• Properly adjust sanitary valves

Topics
• 24000 general service valves
• Sanitary valves
• Low flow and specialty valves
• Packing
• Bench range
• Seat leak testing
• Actuators
• Positioners and FIELDVUE digital valve controllers

Prerequisites
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.

Fisher™ - Nuclear Data Acquisition and Interpretation - Basics – 1427
CEUs – 2.1

Overview
This course is designed for personnel who will perform and interpret control valve diagnostic testing using a QUIKLOOK 3-FS or FlowScanner 6000.

Prerequisites
Knowledge and experience of valves, actuators, control valve instrumentation operation and basic maintenance. Completion of 1400 or 1400V, 1700 or 1700V, and 1450 courses is recommended but not required.

Fisher™ - Nuclear Data Acquisition and Interpretation - Advanced – 1428
CEUs – 2.1

Overview
This 3-day course starts with a brief review of QUIKLOOK 3-FS or FlowScanner 6000 valve diagnostic system software. Confirms student familiarity with test setups, pressure and travel channels, and the objectives of all available test procedures. The course is based on a structured combination of lectures and hands-on labs to teach students how to identify problems in control valve assemblies. Emphasis is placed on determining and confirming overall control valve health and condition by examining each of the major components of the assembly: I/P, positioner, actuator, and valve body. Report generation and some field tips are also presented. To capitalize on learning from shared experiences, students are encouraged to bring in test data from an interesting scenario or a current problem. Those who complete this course will:
• Select the appropriate QUIKLOOK 3-FS or FlowScanner 6000 valve diagnostic system test for a given scenario.
Fisher™ - Control Valve and Instrument Troubleshooting – 1450
CEUs – 2.1

Overview
This 3-day course uses a very hands-on approach for troubleshooting and correcting many common control valve problems. The class will be introduced to the practice of basic valve sizing and selection. Valve problems such as cavitation, flashing, and aerodynamic noise are also discussed as well as common solutions to these problems using different control valve trims and materials. Instrumentation topics are expanded from course 1400/1400V and 1700/1700V to include troubleshooting and advanced calibration for split ranging, non-compatible signals, or using additional instruments such as a volume booster and trip valves. Loop performance issues due to stick-slip, high friction, and instrument operation are discussed.

Topics
- Control loop basics
- Influences on loop performance
- Control valve selection and sizing
- Valve troubleshooting
- Actuator troubleshooting
- Instrument selection
- Basic instrument troubleshooting
- Severe service considerations

Audience
This course is for experienced valve mechanics and maintenance personnel, instrument technicians, and others who will benefit from a broadened perspective of control valve performance and effect on total loop operation.

Prerequisites
Completion of courses 1400 or 1400V (with 1400W) and 1700 or 1700V (with 1700W).

Fisher™ - Control Valve Instrument Maintenance and Calibration – 1700
CEUs – 2.1

Overview
This 3-day course and hands-on workshop covers the principles of operation, calibration and installation procedures for electronic and pneumatic instruments. The class will discuss maintenance procedures for Fisher sliding stem and rotary actuator assemblies. Hands on workshop exercises and lectures to discuss the operation and calibration of many Fisher instruments such as I/P transducers, pneumatic positioners, electro-pneumatic positioners, and Fisher FIELDVUE™ digital valve controllers will be covered. Students will:
- Calibrate a variety of pneumatic and electronic instruments
- Correctly perform installation procedures
- Perform basic troubleshooting of control valve instruments

Topics
- Actuators and bench set
- Current to pneumatic (I/P) transducers
- Instrument terminology
- Pneumatic and electro-pneumatic positioners
- Fisher FIELDVUE digital valve controller

Delivery Options
This training is also available as a remote virtual classroom course 1700V.

Audience
This course is for instrument technicians and others, responsible for pneumatic and electronic instrument calibration, installation and troubleshooting.

Prerequisites
Some experience in electronic and pneumatic instrument maintenance and calibration would be helpful.

Fisher™ - Control Valve Instrument Maintenance & Calibration – 1700V
CEUs – 8

Overview
This 8-hour remote virtual classroom course consists of 4 virtual classroom parts, 2 hours for each part. It will explain the technical operation and maintenance of both sliding stem and rotary actuators. Also discussed will be the design, operation, and calibration principles for both sliding stem and rotary pneumatic positioners. Finally, the course will cover the basic operation and calibration principles for Fisher FIELDVUE digital valve controllers. Fisher documentation will be referenced and used to perform calibration procedures during live interactive sessions. Students also have the option to attend a corresponding hands-on workshop, 1700W, following the completion of the virtual classroom portion of this course.

Topics
- Identify and discuss operation principles of Fisher actuators
- Identify and discuss operation principles of Fisher pneumatic positioners
- Identify and discuss operation principles of Fisher I/P transducers
- Identify and discuss operation principles of Fisher FIELDVUE digital valve controllers

Delivery Options
This training is also available as an Instructor Led course 1700.

Audience
This course offers a technical perspective for the working of Fisher positioners for control valve operation. The course is especially useful to anyone with responsibilities to repair, maintain, and calibrate valve positioners.

Prerequisites
Some experience with industrial control equipment including control valves and actuators would be helpful.
### Fisher™ - Control Valve Instrument - Maintenance & Calibration Hands-on Workshop - 1700W

**CEUs**: .8

**Overview**
This 8-hour workshop is offered as an optional component following the 1700V virtual classroom event. Students will have the opportunity to perform hands-on exercises on control valve actuators and instrumentation that reinforce the maintenance topics that were discussed during the online portion of the course. The workshop is hosted in Marshalltown, IA and a workshop facilitator will be present to assist the students with any questions they may have while performing the exercises.

**Workshops**
- Fisher sliding stem actuator maintenance and repair
- Fisher 657 and 667 actuator bench set
- Fisher rotary actuator maintenance and repair
- Fisher rotary valve and actuator mounting
- Fisher I/P transducer maintenance and calibration
- Fisher 3582 positioner maintenance and calibration
- Fisher 3610J and 3610JP positioner maintenance and calibration
- Fisher FIELDVUE DVC6200 digital valve controller maintenance and calibration

**Audience**
This workshop is intended for any students that have completed the online component of the 1700V course and would like to gain some hands-on experience working with the control valve assemblies.

**Prerequisites**
Must have successfully completed the 1700V course.

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### Fisher™ - Pneumatic Pressure Controller - Maintenance & Calibration – 1720V

**CEUs**: .4

**Overview**
This 4-hour remote virtual classroom course event will explain the technical operation and maintenance of pneumatic pressure controllers and explain the basics of the proportional, integral, and derivative response. Maintenance of common components such as bourdon tubes and bellows elements will be discussed along with the proper procedures for calibrating various Fisher controllers.
- Fisher C1 pressure controller
- Fisher 4150/4160 pressure controller
- Fisher type 4195 pressure controller

**Topics**
- PID Actions
- Operational overview
- Zero and Span Calibration
- Changing control action
- Bourdon tube replacement C1/4150/4160
- Linkage adjustment 4195
- Flapper Leveling 4195

**Audience**
This course offers a technical perspective of the working of Fisher pneumatic pressure controllers. The course is especially useful to anyone with responsibilities to repair, maintain, calibrate, and tune pressure controllers.

**Prerequisites**
None, however some experience and familiarity to process control and general valve operation is recommended.

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### Fisher™ - Pneumatic Level Controller - Maintenance & Calibration – 1730V

**CEUs**: .4

**Overview**
This 4-hour remote virtual classroom course event will explain the technical operation and maintenance of pneumatic level controllers and transmitters. A detailed overview of displacer based level methods for applications including single fluid level, interface, and density will be covered. Basics of proportional, integral, and derivative actions are discussed as well as the proper procedures for mounting, calibrating and configuring the devices.
- Fisher 249 Displacer Sensors
- Fisher 2500 level controller
- Fisher 2502 level controller

**Topics**
- Common level measurement methods
- Displacer basics
- Torque tube construction
- Displacer mounting
- Fisher 249 displacer sensor maintenance
- Mounting and calibrating Fisher 2500
- Mounting and calibrating Fisher 2502

**Audience**
This course offers a technical perspective of Fisher pneumatic level controller and transmitter operation. The course is especially useful to anyone with responsibilities to repair, maintain, calibrate, and tune level controllers and transmitters.

**Prerequisites**
None, however some experience and familiarity to process control and general valve operation is recommended.
Overview
This 4-hour remote virtual classroom course event will explain the technical operation and maintenance of FIELDVUE digital level controllers. An overview of displacer-based level methods for applications including single fluid level, interface, and density will be covered. The class will also discuss connecting to the device and using AMS™ Device Manager software or a field communicator to perform configuration and calibration procedures.

- Fisher 249 Displacer Sensors
- Fisher FIELDVUE DLC3010

Topics
- Displacer basics
- Torque tube construction
- Displacer mounting
- Fisher 249 displacer sensor maintenance
- Mounting Fisher FIELDVUE DLC3010
- Configure FIELDVUE DLC3010 using guided setup for level
- Configure the FIELDVUE DLC3010 for interface applications

Audience
This course offers a technical perspective of the Fisher™ FIELDVUE digital level controller DLC3010. The course is especially useful to anyone with responsibilities to repair, maintain, and calibrate FIELDVUE digital level controllers.

Prerequisites
None, however some experience and familiarity to process control and general valve operation is recommended. Completion of 1730V is strongly encouraged.

Overview
This 3-day course provides hands-on experience working with FIELDVUE digital valve controllers using an Emerson 475 or AMS Trex™ Communicator. The class will discuss basic operation and installation of the FIELDVUE digital valve controllers. Students will practice installing and mounting FIELDVUE digital valve controllers onto sliding stem and rotary control valve assemblies, as well as perform basic configuration and calibration of FIELDVUE Instruments. Troubleshooting the digital valve controller using ValveLink™ Mobile software will be performed and basic data interpretation will be introduced.

Topics
- FIELDVUE digital valve controller theory of operation
- FIELDVUE instrument installation
- Diagnostic troubleshooting and data interpretation using ValveLink Mobile with AD and PD tier devices

Audience
This course is for technicians, engineers and others responsible for installing, calibrating and basic troubleshooting Fisher FIELDVUE instruments using the Emerson Field Communicators with ValveLink Mobile.

Prerequisites
Some experience in instrument calibration and maintenance, and operation would be helpful.
Overview
This 3-day course uses practical exercises and discussions to teach the student to interpret and analyze diagnostic data obtained using FIELDVUE digital valve controllers and ValveLink software. Students will perform diagnostic tests on a variety of valve/actuator combinations and use the data to determine bench set, dynamic error band, seat load, spring rate and other pertinent parameters. Students will also perform comparison tests on valve/actuator assemblies containing configuration or operating flaws and use the data for troubleshooting purposes.

Topics
- Review of ValveLink software diagnostic tests
- Data interpretation
- Troubleshooting techniques
- Comparison testing techniques
- Performance diagnostics

Audience
This course is for technicians, engineers and others responsible to collect and interpret valve diagnostic tests performed using ValveLink™ software.

Prerequisites
Students must have completed one of the following: 1751, 1752, 7036, or 1760V Series (1760V, 1761V, 1762V, 1763V).

Fisher™ - FIELDVUE™ Digital Valve Controllers – 1760V
CEUs – .4

Overview
This 4-hour remote virtual classroom course covers the detailed operation of Fisher FIELDVUE digital valve controllers. Class discussions are centered on what individual components within a digital valve controller are, and how they can affect overall control valve performance. Common maintenance practices are detailed, and include proper care and handling of internal components, such as the I/P and Relay. Calibration procedures of the FIELDVUE DVC6200 digital valve controller will be conveyed using ValveLink™ software connected to a live device. Course focus includes:
- Identify and understand components of a digital valve controller
- Describe and demonstrate proper instrument mounting
- Connect to a live device using ValveLink Software
- Discuss and perform a guided setup routine
- Discuss and perform an auto travel calibration routine

Topics
- Pneumatic instrument principle overview
- Operation of a FIELDVUE digital valve controller for travel control
- Operation of a FIELDVUE digital valve controller for pressure control
- Replacing FIELDVUE digital valve controller components
- Mounting a FIELDVUE digital valve controller
- Calibrating a FIELDVUE digital valve controller

Audience
This course is designed for those who have the job responsibility to repair, mount, configure, and calibrate Fisher FIELDVUE digital valve controllers.

Prerequisites
Experience and familiarity of process control and general valve operation is recommended. Completion of course 1700 or 1700V is strongly encouraged.

Fisher™ - FIELDVUE™ Digital Valve Controller - HART® Communicating (HC) Tier – 1761V
CEUs -.4

Overview
This 4-hour remote virtual classroom course event covers the detailed setup of the FIELDVUE digital valve controllers. The class will discuss navigating through the detailed setup menus to change device operation and configuration parameters, as well as set alerts and alarms and correctly complete the device specification sheet. Students will have access to a live FIELDVUE DVC6200 using ValveLink™ software. In conjunction with HC tiering capabilities, a basic understanding of functions and troubleshooting within ValveLink software is discussed at length. Course focus includes:
- Detailed Setup - basic page group
- Detailed Setup - alert page group
- Detailed Setup - specification sheet
- Status Monitor
- Stroke Valve Test

Topics
- Saving device configuration as found
- Viewing device datasets
- Comparing current datasets to historical datasets
- Restoring historical datasets
- Using status monitor
- Interpreting data from status monitor
- Performing a stroke valve test

Audience
This course is designed for those who have the job responsibility to perform detailed configurations and basic diagnostic troubleshooting of FIELDVUE digital valve controllers with HC tier.

Prerequisites
Successful completion of 1760V is required.
Overview
This 4-hour remote virtual classroom course event introduces data collection methods for offline diagnostic testing and troubleshooting of the FIELDVUE digital valve controllers with Advanced Diagnostic (AD) Tier. Students will have access to a live FIELDVUE DVC6200 using ValveLink™ software and will discuss the proper setup and execution of diagnostic functionality within the AD tier. Dynamic scan and step response tests will be conducted, and the class will interpret analyzed data and review the details of diagnostic graphs for each. Areas of focus for AD diagnostic functionality include:

- Step Response Test - stroking speed
- Step Response Test - 9-point step test
- Step Response Test - performance test
- Step Response Test - 3-point ramp
- Step Response Test - supply pressure
- Step Response Test - drive signal
- Valve Signature - graph and analyzed data
- Dynamic Error Band
- Drive Signal

Topics
- Verifying specification sheet information
- Viewing/initializing AD related diagnostic information
- Identifying common features of diagnostic graphs
- Interpreting AD tier diagnostics

Audience
This course is designed for those with job responsibilities to configure and perform diagnostic tests as well as interpret diagnostic data of the FIELDVUE digital valve controller with AD tiering.

Prerequisites
Successful completion of 1760V and 1761V is required.

Overview
This 4-hour remote virtual classroom course event introduces data collection methods for online diagnostic testing and troubleshooting of the FIELDVUE digital valve controllers with Performance Diagnostic (PD) Tier. Students will have access to a live FIELDVUE DVC6200 device using ValveLink™ software and will discuss the proper setup and execution of diagnostic functionality within the PD tier. Permanent tiering step-up options are discussed, including the free one-time step up to PD tier, as well as specific procedures to follow when changing a digital valve controller’s diagnostic tier. Diagnostic functions of interest include:

- PD One Button
- Profiles
- Triggered Profiles
- Friction
- Friction Trends

Topics
- Verifying specification sheet information
- Running a PD One Button Test
- Viewing/analyzing PD related diagnostic information
- Configuring scheduler to run diagnostics
- Configuring/Activating trending and network alert scan functions
- Understanding digital valve controller diagnostic tiering levels

Audience
This course is designed for those with job responsibilities to perform and interpret online diagnostic tests associated with the FIELDVUE digital valve controller with PD tiering.

Prerequisites
Successful completion of 1760V, 1761V, and 1762V is required.

Overview
This 3-day course reviews the role and function of control valve positioners followed by a series of hands-on exercises to disassemble, inspect, assemble, install, and commission a FOUNDATION fieldbus FIELDVUE digital valve controller. During commissioning, students will learn the basics of the FOUNDATION fieldbus protocol, the role of function blocks, addressing, modes and status. Students will configure, calibrate, and commission devices using Emerson Communicator and ValveLink™ Solo software. Hands-on exercises also teach students how to perform detailed setup routines and how to run and collect data for various ValveLink software diagnostics.

Topics
- Positioner Basics
- FOUNDATION fieldbus overview
- FIELDVUE digital valve controller installation and mounting
- Modes and status
- Configuration and calibration with the 475 or AMS Trex™ Communicator and ValveLink Mobile
- ValveLink™ software guided Setup/Detailed Setup
- Tuning
- Tag management
- Pressure control
- ValveLink software diagnostics
- FIELDVUE instrument troubleshooting

Audience
This course teaches technicians and engineers the basics of FOUNDATION fieldbus digital valve controller installation, configuration, calibration, and troubleshooting.

Prerequisites
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.
Fisher™ - Simulated Controller Tuning – 9006V
CEUs - .8

Overview
This 8-hour virtual classroom course event consists of 4 parts, 2 hours for each part. Students will be introduced to the fundamentals of PID control. The control and response characteristic of each PID component will be explained and students will have the opportunity to see their effect using simulated loop software accessed through a virtual machine. Using the software, the class will also work through and discuss different strategies for tuning various process loops. These strategies include non-calculation based methods like trial and error, as well as, calculation based methods such as lambda tuning.

Topics
- Elements of PID control
- Load upsets; process noise
- Self-regulating process
- Integrating process
- Valve dead band and stick/slip
- Limit cycling
- Trial and error tuning
- Lambda tuning

Delivery Options
This training is also available as an Instructor Led course 9006.

Audience
This course is designed for those who have the job responsibility of tuning or monitoring industrial process control loops. Students will learn to tune controllers to meet the needs of each loop.

Prerequisites
Some basic understanding of process measurement and control is recommended.
Hytork™ Products - VA108
CEUs - 2.1

Overview
This 3-day class provides a solid grounding in valve automation solutions in general with detailed and specific information given on the range of actuators and control accessories available from Hytork™. Classes are tailored to fit specific student requirements.

Topics
- Overview of Hytork™
- Key Accounts and Markets
- Pneumatic Actuators, History, Theory and Different Types
- Comparison of Pneumatic Actuators to Electric, Hydraulic and Electro-Hydraulic Designs
- Advantages of the Rack & Pinion Design
- ISO Standards
- General Valve Automation Applications
- Hytork Actuators Variations and Evolution
- Valve Automation Accessories Including Limit Switches, Solenoids Valves, Speed Control Valves and Valve Mounting Options
- Mounting of Control Accessories
- Hytork Products Features and Benefits
- General Valve Types/Torque Characteristics
- Actuator Sizing Techniques, Test Questions
- Hytork Actuator Sizing
- Hytork Drawing Types and Procedures
- QA Systems, Function’s, RMA’s and Customer Complaint Handling
- Hytork Product Warranties
- Price Book Review
- Hands-on Actuator Assembly, Disassembly, Mounting and End-Stop Adjustment
- Question and Answer Session
- Final Test

Prerequisite
Students should be involved with the purchase, application, marketing, sales or service/maintenance of Hytork™ products.
AMS - Introduction to AMS Machinery Manager - 2068
CEUs - 2.8

Overview
In this 4-day class students learn methods of database creation and vital features of route creation such as collecting reference data, analyzer/computer communication, and the basic concepts of Analysis Parameter Sets, Alarm Limit Sets, and Fault Frequency Sets. A machinery analyzer is used to demo the process of loading routes for data collection. This course will also include a basic overview of the vibration plotting application and reporting functions.

This course is based on the current mass release of the AMS Machinery Manager software. Students can call to verify if the course is appropriate to the version they are using. Wireless technology, Infrared Analysis, Motorview, Online Monitor and Oilview modules are covered in other course offerings and are not part of this course.

Topics
• RBMwizard
• Database Setup
• Route management and Data transfer
• Reports
• Vibration Analysis module

Audience
This course was designed for the new users of AMS Machinery Manager.

Prerequisites
Computer experience with the Windows operating system and some vibration analysis experience are recommended.

AMS - Introduction to AMS Machinery Manager, Virtual Classroom - 2068V
CEUs - 2.8

Overview
This 4-day class students learn methods of database creation and vital features of route creation such as collecting reference data, analyzer/computer communication, and the basic concepts of Analysis Parameter Sets, Alarm Limit Sets, and Fault Frequency Sets. A machinery analyzer is used to demo the process of loading routes for data collection. This course will also include a basic overview of the vibration plotting application and reporting functions.

This course is based on the current mass release of the AMS Machinery Manager software. Students can call to verify if the course is appropriate to the version they are using. Wireless technology, Infrared Analysis, Motorview, Online Monitor and Oilview modules are covered in other course offerings and are not part of this course.

Topics
• RBMwizard
• Database Setup
• Route management and Data transfer
• Reports
• Vibration Analysis module

Audience
This course was designed for the new users of AMS Machinery Manager.

Prerequisites
Computer experience with the Windows operating system and some vibration analysis experience are recommended.

AMS - Intermediate AMS Machinery Manager - 2074
CEUs - 2.8

Overview
This 4-day course teaches some of the more advanced machinery analysis techniques available in AMS Suite Machinery Health™ Manager Software. This course focuses more on analysis and reporting with the use of Vibration Analysis module, Reporting module, Exception Analysis, PEAKVUE™ technology and full version of RBMview.

This course is based on the current mass release of the AMS Machinery Manager software. Students can call to verify if the course is appropriate to the version they are using. Wireless technology, Infrared Analysis, Motorview, Online Monitor and Oilview modules are covered in other course offerings and are not part of this course.

Topics
• PEAKVUE™ Technology
• Vibration Analysis module
• Reporting Module
• Exception Analysis
• Nspector
• BMview
• Data Transfer
• Route Modification

Prerequisites
Intro to AMS Machinery Health™ Manager (course # 2068), Basic Vibration Analysis course or 6 months vibration analysis experience are recommended.
AMS - Intermediate AMS Machinery Manager - Virtual - 2074V
CEUs - 2.8

Overview
This 4-day course teaches some of the more advanced machinery analysis techniques available in AMS Suite Machinery Health™ Manager Software. This course focuses more on analysis and reporting with the use of Vibration Analysis module, reporting module, Exception Analysis, PEAKVUE™ technology and full version of RBMview.

This course is based on the current mass release of the AMS Machinery Manager software. Students can call to verify if the course is appropriate to the version they are using. Wireless technology, Infrared Analysis, Motorview, Online Monitor and Oilview modules are covered in other course offerings and are not part of this course.

Topics
- PEAKVUE™
- Vibration Analysis module
- Reporting Module
- Exception Analysis
- Nspectr
- BMview
- Data Transfer
- Route Modification

Prerequisites
Intro to AMS Machinery Health™ Manager (course # 2068), Basic Vibration Analysis course or 6-months vibration analysis experience are recommended.

AMS - Advanced AMS Machinery Manager - 2070
CEUs - 2.8

Overview
This 4-day course is the third in our series of AMS Machinery Manager courses. Its focus is on the management, modification and optimization of the existing AMS Machinery Manager database. Students will learn how to modify existing Wizard configurations, add and edit users, statistically adjust alert and fault levels, make global database changes, and many other very useful database functions. This course is based on the current mass release of the AMS Machinery Manager software. Students can call to verify if the course is appropriate to the version they are using. Wireless technology, Infrared Analysis, Motorview, Online Monitor and Oilview modules are covered in other course offerings and are not part of this course.

Topics
- Advanced Analysis Features in Vibration Analysis Module
- Problem Reporting
- Status-at-a-Glance Operation and Reporting
- Nspectr®
- Wizard - Reporting Techniques and Modification/Addition of Setup Information
- Austostat
- Database Utility
- Database Zip Utility
- Network Administration
- Data Locker Management

Audience
This course is intended for the advanced user who has already created a machinery database and has been acquiring, storing and analyzing data for six months or more.

Prerequisites
Intermediate Vibration (course 2032) or one-year vibration analysis experience are recommended. Experience with the Windows operating system is recommended.
AMS - Machinery Manager Database Optimization Workshop - 2003
CEUs - 2.8

Overview
This 4-day course is the fourth in our series of AMS Machinery Manager courses. This course will instruct experienced users on database optimization techniques using an existing database and enhancing it by calculating and implementing improved Analysis Parameter (AP) sets. Students will learn how to identify when an AP set needs to be adjusted and how to make the adjustments effectively. This course will also focus on updating and optimizing alarm sets. Applications will include Vibration Analysis tab, Database Setup, Database Utility, Stored Data Management and AutoStat.

Topics
• Understanding the Database
• Managing Invalid Data
• Analysis Parameter Set Review
• Manual Alarm Adjustment
• AutoStat Alarm Adjustment
• Warning Alarms

This course is based on the current mass release of the AMS Machinery Manager software. Students may call to verify if the course is appropriate to the version they are using.

Prerequisites
Introduction to AMS Machinery Manager (course #2068), Intermediate AMS Machinery Manager (course #2070), Advanced AMS Machinery Manager (course #2070), Intermediate Vibration (course #2032) or two-years vibration analysis experience are strongly recommended.

AMS - Machinery Manager Database Optimization Workshop – Virtual – 2003V
CEUs - 2.8

Overview
This 4-day course is the fourth in our series of AMS Machinery Manager courses. This course will instruct experienced users on database optimization techniques using an existing database and enhancing it by calculating and implementing improved Analysis Parameter (AP) sets. Students will learn how to identify when an AP set needs to be adjusted and how to make the adjustments effectively. This course will also focus on updating and optimizing alarm sets. Applications will include Vibration Analysis tab, Database Setup, Database Utility, Stored Data Management and AutoStat.

Topics
• Understanding the Database
• Managing Invalid Data
• Analysis Parameter Set Review
• Electric Motor Points
• Manual Alarm Adjustment
• AutoStat Alarm Adjustment
• Warning Alarms

This course is based on the current mass release of the AMS Machinery Manager software. Students may call to verify if the course is appropriate to the version they are using.

AutoStat for AMS Machinery Manager Virtual Classroom – 2070CV
CEUs - 1.4

Overview
AutoStat is included in the standard curriculum of the 4-day Advanced AMS Machinery Manager course (course #2070). This 2-day session only covers AutoStat in the AMS Machinery Manager software.

Alarms are an important part of any analysis program. Properly setting alarms allows the user to quickly identify an abnormal machine condition and reduces time spent analyzing machines that are running in acceptable or “normal” condition.

AMS Machinery Manager provides the user the ability to create up to 12 parameter bands with alarms in addition to the Overall value. Calculating ideal alarm values for these parameters can be very complicated. AutoStat uses statistical analysis to provide limit values for the individual parameter bands by analyzing the data associated with similar pieces of equipment.

This 2-day session is designed for students have a basic understanding of AMS Machinery Manager and will guide these users through the process of using AutoStat for the generation of both Analysis Parameter sets and Statistical narrowband Envelope generation.

Topics
• Creating Analysis Groups
• Modifying Parameter Band Alarms
• Creating New Alarm Limits
• Parameter band Alarms versus Narrow Band Alarms
• Creating Statistical Envelopes
Machinery Health - Plantweb™ Optics - Introduction – 2040
CEUs – 2.1

Overview
This 3-day course is designed for new users of the Plantweb Optics software and is based on the current software release. Students will learn how to navigate through the software, manage their databases by adding locations and assets using the Plantweb Optics Asset Explorer utility. The AMS 9420 is used to show the user how to bind assets and map vibration measurement points for data collection. Collected data will be analyzed using the AMS Machine Works’ Vibration Analyzer application.

Students will also learn how to navigate the Plantweb Optics Asset Viewer utility used on PC/laptop and mobile device applications to receive real-time information about equipment that is relevant to their job.

Topics
- Basic Navigation
- Database Building using Asset Explorer
- Mapping and Binding Assets to the AMS 9420
- Asset Viewer utility
- User Manager (Setting users/Permissions/Tokens for the App)
- Asset Viewer utility Mobile App
- AMS Machine Works

Prerequisites
Computer experience with the Windows operating system and some vibration analysis experience are recommended.

Machinery Health - Plantweb Optics Deployment – 2041
CEU – 0.8

Overview
This course goes through the specific tasks necessary to properly deploy Plantweb Optics. It is part of a deployment certification path for Plantweb Optics

Topics
- Pre-trip readiness elements
- WebEx kickoff
- SQL database setup
- Network architectures
- Cyber deployment declarations
- Data source readiness
- Functional Design Specification document used as the checklist for site visit readiness.
- Detailed deployment task
- All checklists Installing the software and basic training
- Network and cyber security essentials are covered during the architecture discussions.

Prerequisites
None

AMS - Wireless Vibration Transmitter for Plantweb™ Optics - 9420 – 2042
CEU – 0.7

Overview
This 1-day course is designed for new users of the AMS 9420 Wireless Vibration Transmitter with the Plantweb Optics Software. The course is based on the current software release. The AMS 9420 is used to show the user how to bind assets and map vibration measurement points for data collection. Collected data will be analyzed using the AMS Machine Works’ Vibration Analyzer application.

Topics
- Database Building using the Asset Explorer utility
- Mapping and
- Binding Assets to the AMS 9420
- Configuration of the AMS 9420
- Data Analysis using AMS Machine Works
- Audience
- New users of the AMS 9420 Wireless Vibration Transmitter with the Plantweb Optics software.

Prerequisites
Completion of course 2040 is required before attending course 2042. Computer experience with the Windows operating system and some vibration analysis experience are recommended.

Machinery Health™ - AMS 9420 Wireless Vibration Transmitter for AMS Machinery Manager - 2025
CEUs – 1.4

Overview
This 2-day course is intended for technicians, engineers and other plant personnel who need to know to setup, maintain, troubleshoot, and view data from the AMS 9420 Wireless Vibration Transmitter in conjunction with the AMS Machinery Manager Software. The course uses lecture and labs to maximize the hands-on experience for the students.

Topics
- Overview of AMS 9420 hardware components
- Overview of the 1420 Wireless Gateway
- Vibration basics and terminology relating to AMS 9420
- Import data into AMS Machinery Manager
- View data using AMS Machinery Manager
- Troubleshooting and maintenance

Audience
This course is intended for technicians, engineers and other plant personnel who need to know how to setup, maintain, troubleshoot, and view data from the AMS 9420 Wireless Vibration Transmitter

Prerequisites
Course 2375 (Wireless Self Organizing Network) and some experience in Networks and Host integration would be helpful.
## Machinery Health™ – AMS Machinery Manager: Vibration Analysis Workshop for the PDM Professional - 2008

**CEUs - 1.4**

**Overview**
The purpose of this blended learning workshop is to provide the vibration analyst with an interactive learning environment that enhances their understanding of the features of the Vibration Analysis program using Emerson’s AMS Machinery Manager Software. This workshop was designed as a self-paced blended learning training experience. The student will be provided with a workbook, access to a Virtual Training Computer and an eLearning module.

The workbook contains eleven topical exercises for use with the Vibration Analysis tab in AMS Machinery Manager software. The student will also be given a link to a Virtual Training Computer to complete the exercises using AMS Machinery Manager software. If there are questions on how to complete steps in the exercise, an eLearning module will provide assistance to the student.

If questions cannot be answered with the assistance of the eLearning module, students will also be able to email questions to an instructor at mhm.training@emerson.com. Instructors will respond to students as quickly as possible.

**Objectives**
Provide the student with self-paced exercises to advance his/her knowledge and proficiency with the use of AMS Machinery Manager Vibration Analysis tools.

**Prerequisite**
Some knowledge of AMS Machinery Manager software and basic vibration analysis is recommended.

## Machinery Health™ – Fundamentals of CSI 2130 - 2072

**CEUs - 1.4**

**Overview**
This 2-day hands-on course focuses on the basic operation of the CSI 2130 Machinery Health™ Analyzer. Students will collect data on lab machines. Note: You may take with Fundamentals of Vibration as a 4-day course.

**Topics**
- Analyzer/Computer Communication
- Predefined Route Data Collection
- Off-Route Data Collection
- Setup Monitor Mode Measurements
- Peak and Phase Measurements

**Audience**
This course is designed for students with little or no experience with CSI analyzers, but who are experienced in the field of vibration data collection and analysis.

**Prerequisites**
Understanding of vibration analysis.

## Machinery Health™ – Fundamentals of CSI 2130 - e2130 - CEUs - 0.6

**Overview**
Emerson’s Machinery Health™ training now includes Fundamentals of the 2130 eLearning course, designed to provide you with the tools you need to perform data collection using the CSI 2130 Machinery Health Analyzer. This course provides guided demonstrations through the processes of installing necessary drivers, uploading updated firmware, and loading updated or newly-purchased programs necessary for data collection. Learn how to load a pre-defined route into the CSI 2130, gather general data as well as specialized data, and then interface the data back with a computer for further diagnostic analysis.

**Topics**
- Analyzer-Computer Communication
- Predefined Route Data Collection
- Off-Route Data Collection and Setup
- Monitor Mode Measurements
- Peak and Phase Measurements

## Machinery Health™ – Advanced CSI 2130 – 2091

**CEUs - 2.1**

**Overview**
This 3-day class covers advanced signal processing using Emerson’s patented PEAKVUE technology for slow-speed analysis, transient capabilities, coherence and cross-channel phase, operating deflection shapes (ODS), modal analysis, and other advanced techniques.

**Topics**
- PEAKVUE™
- Resonance Detection
- Dual Channel Data Collection
- Fundamentals of Cross-Channel Data Collection
- Introduction to Coherence and Cross-Channel
- Phase
- Orbit Data Collection
- Introduction to Operating Deflection Shape (ODS) Testing Methods
- Introduction to Modal Analysis Testing Methods
- Advanced Two-Channel DLPZoom Analysis, Cascade and Overall
- Transient Wave Form Capture and Analysis
- CSI 2130 Analysis Experts

**Audience**
This course is intended for students with single-channel vibration analysis experience and little or no multi-channel experience.

**Prerequisites**
Single channel vibration analysis experience is required.
Overview
This 2-day hands-on course focuses on the basic operation of the AMS 2140 Machinery Health™ Analyzer. Students collect data on lab machines. Note: You may take with Fundamentals of Vibration as a 4-day course.

Topics
• Analyzer/Computer Communication
• Predefined Route Data Collection
• Job Data Collection and Setup
• Manual Mode Measurements
• Introduction to CSI 2140 Analysis Expert Functions

Audience
This course is designed for personnel with little or no experience with Emerson analyzers, but who are experienced in the field of vibration data collection and analysis.

Prerequisites
Understanding of vibration analysis. Familiar with basic vibration collection principles.

Overview
Emerson’s Machinery Health™ training now includes the Fundamentals of the AMS 2140 eLearning course, designed to provide you with the tools you need to perform data collection using the AMS 2140 Machinery Health Analyzer. The course leads you through a basic introduction of the analyzer including panel descriptions and reviews of the purpose and function of all connectors, ports, slots, keys, indicators and buttons. The user learns how to load a pre-defined route into the analyzer, take general data as well as specialized data, and then dump that data back into the computer for further diagnostic analysis.

Topics
• Analyzer/Computer Communication
• Predefined Route Data Collection
• Job Data Collection and Setup
• Manual Mode Measurements
• Introduction to AMS 2140 Analysis Expert Functions

Audience
This course is intended for personnel with single-channel vibration analysis experience and little or no multi-channel experience.

Prerequisites
Single channel vibration analysis experience is required.

Overview
This 3-day course is intended for personnel with single-channel vibration analysis experience and little or no multi-channel experience. This class covers advanced signal processing using Emerson’s patented PEAKVUE™ technology for slow-speed analysis, coherence and cross-channel phase, operating deflection shapes (ODS), modal analysis, and other advanced techniques.

Topics
• PEAKVUE™
• Resonance Detection
• Dual Channel Data Collection
• Fundamentals of Cross-Channel Data Collection
• Introduction to Coherence and Cross-Channel Phase
• Orbit Data Collection
• Introduction to Operating Deflection Shape (ODS) Testing Methods
• Introduction to Modal Analysis Testing Methods
• Advanced Two-Channel DLP
• Zoom Analysis, Cascade, and Overall Transient Time Waveform Capture and Analysis
• AMS 2140 Analysis Experts Functions

Audience
This course is intended for personnel with single-channel vibration analysis experience and little or no multi-channel experience.

Prerequisites
Understanding of vibration analysis. Familiar with basic vibration collection principles.

Overview
The 2-day class prepares participants for the Basic Vibration Analysis Course. Students learn about causes of vibration and methods of measurement. Although the training course does not provide instruction on Emerson's technologies, the class will use them to demonstrate vibration principles.

Topics
• Introduction to Vibration Components of a Predictive Maintenance Program
• Basic Fault Identification
• Vibratory Fault Characteristics and Patterns
• Information to Help Jump Start a Vibration Program

Audience
This vibration training course is for those with no prior experience in vibration analysis.

Overview
The course introduces the technology of vibration analysis by explaining what vibration analysis is and how it plays a critical role in any predictive maintenance program. Students are led through a self-paced discussion on how vibration analysis works with many examples of the types of faults that can be detected. Students will also gain an understanding of how and how vibration is measured with an emphasis on good data collection techniques. Students will learn important terminology that will be critical to their success as they progress to the next level of training in vibration analysis; Emerson’s Basic Vibration Analysis course.

Topics
• Chapter 1: Fundamentals of Vibration
• Chapter 2: How is Vibration Measured?
• Chapter 3: Understanding the Vibration Signal
• Chapter 4: Vibration Units
• Chapter 5: Analysis Parameters
• Chapter 6: Data Analysis: Where to begin?

Audience
This e-course provides instruction to individuals with no prior experience in vibration analysis.
Machinery Health™ - Fundamentals of Vibration & CSI 2130 - 2013
CEUs - 2.8

Overview
Course 2013 is the course# for 2069 & 2072 combined.

Fundamentals of Vibration Analysis - 2069 (CEUs - 1.4)
The 2-day class prepares participants for the Basic Vibration Analysis Training Course. Students learn about causes of vibration and methods of measurement. Although the training course does not provide instruction on Emerson's technologies, the class uses them to demonstrate vibration principles.

Topics
• Introduction to Vibration
• Components of a Predictive Maintenance Program
• Basic Fault Identification
• Vibratory Fault Characteristics and Patterns
• Information to Help Jump Start a Vibration Program.

Audience
This 2-day course is for those with no prior experience in vibration analysis.

Course# 2072: Fundamentals of CSI 2130 (CEUs: 1.4)
This 2-day hands-on course focuses on the basic operation of the CSI 2130 Machinery Health Analyzer. Students collect data on lab machines. This course is designed for personnel with little or no experience with CSI analyzers, but who are experienced in the field of vibration data collection and analysis.

Prerequisites: Understanding of vibration analysis.

Course highlights include:
• Analyzer/computer communication
• Predefined route data collection
• Off-route data collection and setup
• Monitor mode measurements
• Peak and phase measurements

Machinery Health™ - Fundamentals of Vibration & AMS 2140 - 2014
CEUs - 2.8

Overview
Course 2014 is the course# for 2069 & 2076 combined.

The 2-day class prepares participants for the Basic Vibration Analysis Training Course. Students learn about causes of vibration and methods of measurement. Although the training course does not provide instruction on Emerson’s technologies, the class uses them to demonstrate vibration principles.

Topics
• Introduction to Vibration
• Components of a Predictive Maintenance Program
• Basic Fault Identification
• Vibratory Fault Characteristics and Patterns
• Information to Help Jump Start a Vibration Program.

Audience
This 2-day course is for those with no prior experience in vibration analysis.

Machinery Health™ - Basic Vibration Analysis – 2031
CEUs - 2.8

Overview
This 4-day course complies with Category I Vibration Analyst per ISO standard 18436-2: Vibration condition monitoring and diagnostics. Although this training course is not product specific, students will use Emerson’s AMS technologies for demonstration purposes. The class shows the student how to use the vibration analyzer in conjunction with Emerson AMS Machinery Manager software to analyze basic vibration defects. Participants will receive a complimentary copy of the Pocket Vibration Analysis Trouble-Shooter Guide.

Topics
• Introduction to Vibration
• Measurement Setup
• Data collection and analysis
• Basic analyzer functions
• The class shows the students how to recognize machine defects such as:
  • Imbalance
  • Shaft misalignment
  • Looseness
  • Rolling element bearing defects
  • Gear problems
  • Resonance
  • Belt Defects
  • AC Induction Motors
  • Journal Bearings
  • Rotating Equipment

Audience
This course is intended to enable students to operate single channel machinery analyzers, dump and load routes, recognize the difference between good and bad data, and compare vibration measurements against pre-established alert settings.

Prerequisites
Fundamentals of vibration or up to six months of vibration experience is recommended.

Machinery Health™ - Vibration Analyst Exam - Category I - 2021EX

Overview
Category I exam, available at the end of course# 2031
Test Format: Written exam
Duration: 2 hours, Passing Grade: 70%

Eligibility for Examination
• Recommended Minimum Duration of Cumulated Training (hours): 32
• Recommended Minimum Duration of Cumulated Experience (months): 6
### Machinery Health™ - Intermediate Vibration Analysis – 2032
**CEUs - 2.8**

**Overview**  
This 4-day course complies with Category II Vibration Analyst per ISO standard 18436-2: Vibration condition monitoring and diagnostics. Category II vibration analysts are expected to be able to select appropriate vibration measurement techniques, set up instruments for basic resolution of amplitude, frequency, and time, perform basic spectrum analysis, maintain a database of results and trends, perform single-channel impact tests, classify, interpret, and evaluate test results in accordance with applicable specifications and standards, recommend minor corrective actions, and understand basic single plane field balancing concepts.

This course also features the use of the Emerson Machinery Analyzer in conjunction with advanced machinery analysis techniques. Discussions of case histories on machinery faults are one of the focal points of this course. Students will receive a complimentary copy of the Simplified Handbook of Vibration Analysis, Volume I, by Art Crawford.

**Topics**
Recognition of Machine Defects including:
- Reference Standards
- Imbalance
- Misalignment
- Bent Shaft
- Soft Foot
- Antifriction and Journal Bearings
- Looseness
- Resonance
- Electrical Defects
- Gearboxes
- Belts

**Prerequisites**
Basic Vibration Analysis course and a cumulative 18 months of field experience are recommended.

### Machinery Health™ - Advanced Vibration Analysis - 2033
**CEUs - 2.8**

**Overview**  
This 4-day course complies with Category III Vibration Analyst per ISO standard 18436-2: Vibration condition monitoring and diagnostics. This course expands on the subjects covered in the Intermediate Vibration course (Category II), especially in the areas of fault analysis and corrective actions. The class details advanced analysis techniques. The dual channel Machinery Health™ analyzer features are introduced including the use of AMS Machinery Manager Software to set up the advanced analyzer features and the powerful download-able programs for data collection. The transient Machinery Health analyzer capabilities are covered such as long-term time waveform. The class covers advanced resonance detection using a variety of testing methods, including triggered data collection.

Students will receive a complimentary copy of the Simplified Handbook of Vibration Analysis, Volume I, by Art Crawford.

**Topics**
- Specify Appropriate Vibration Instrumentation Hardware and Software for both Portable and Permanently Installed Systems
- Perform Spectrum and Time Waveform Analysis Under both Steady-State and Unsteady Operating Conditions
- Measure and Analyze Basic Operational Deflection Shapes (ODS)
- Slow Speed Technology (SST®)
- Zoom Analysis
- Transient Techniques
- Digital Signal Processing
- Demodulation
- Resonance Detection

**Prerequisites**
Intermediate Vibration Analysis course and a cumulative three years of field experience are recommended.

### Machinery Health™ - Vibration Analyst Exam - Category III - 2023EX

**Overview**  
Category III exam, available at the end of course# 2033  
Test Format: Written exam  
Duration: 4 hours  
Passing Grade: 70%

**Eligibility for Examination**
- Recommended Minimum Duration of Cumulated Training (hours): 70
- Recommended Minimum Duration of Cumulated Experience (months): 36
- Has taken and passed the Category II exam.

### Machinery Health - Rotor Dynamic Analysis for Vibration Analysts - Basic – 2034
**CEUs – 3.5**

**Overview**  
This course is part one of the two courses required for the Category IV examination.

This 5-day class is designed to allow the students to better understand rotor dynamics and their options when facing a problem piece of equipment that is running at or close to its critical speeds. This course will provide vibration analysts a road map to develop a plan to perform basic calculations to estimate the critical speeds of different types of machinery. Lab calculations will be performed by the students throughout the course to reinforce topics learned in the class. These techniques can be applied to all types of rotating machinery using either journal bearings or rolling element bearings.

**Topics**
- Introduction to Basic Rotor Dynamics
- Natural Frequencies
- Free versus Forced Vibrations
- Stiffness
- Damping
- Natural Frequency Equations
- Forced Vibrations
- Amplification (Q) Factor calculation Methods
- Types of Journal Bearings
- Center Hung Rotors versus Overhung Rotors
- Rigid Rotors versus Flexible Rotors
- Subharmonic Resonance
- Shaft Instabilities
- Cracked Shafts
- Required Information for Critical Speed Analysis
- Field Testing for Modeling Requirements
- Rotor Modeling
- Shaft Hand Calculations
- Computer Modeling

**Audience**
Vibration analysts, reliability engineers Prerequisites
Pass Category III exam
Machinery Health - Instrumentation & Analysis Techniques - Advanced - 2044 CEs – 3.2

Overview
This 4-day class will provide the attendee with a solid background on how a data collector, FFT analyzer, functions. It will provide necessary information on how the FFT process works and how the end user can use the instrument to its’ full capabilities. Students will learn the strengths and limitations of the modern data (FFT) collector.

Demonstrations will be performed to reinforce training topics. Lab calculations will be performed by the students throughout the course to reinforce topics learned in the class. This course is part two of the two courses required for the Category IV Vibration Analyst examination.

Topics
- Basic Navigation
- The FFT Analyzer
  - Resolution
  - Dynamic Range
  - Window Effects
  - Overlap
  - Filtering
  - Accuracy of the amplitudes and frequencies versus window effects
- Averaging
- Modulation
- Beats
- Multi-Channel Analysis
- Transient Data Analysis
  - Nyquist Plots
  - Bode Plots
  - Waterfall Plots
- Impact Testing
  - Natural Frequencies
  - Mode Shapes versus Operating Deflection
  - Stiffness from Impact Testing
- Methods of calculating Damping
  - From “Q” Factor
  - Modal Analysis

Audience
Vibration analysts seeking Category IV certification

Prerequisites
Machinery Health - Rotor Dynamic Analysis for Vibration Analysts - Basic - 2034

Exam - Category IV - 2024EX
Overview
Test Format: Written exam
Duration: 5 hours
Passing Grade: 70%Eligibility for Examination:
- Minimum Duration of Training (hours): Category III + 64
- Minimum Duration of Cumulated Experience (months): 60
- Has taken and passed the Category III exam.

Machinery Health™ - PEAKVUE™ Mystery and Autocorrelation - 2035 CEUs - 2.1

Overview
This 3-day course provides insight into advanced functionality of Emerson's unique PEAKVUE™ technology and Autocorrelation. Machine vibrations generate both macro and microscopic vibrations, and microscopic vibrations generate stress waves that have frequency ranges determined by the mass of the impacting object. The properties of these stress waves will be explained. The Autocorrelation section of the course will teach the power of the autocorrelation coefficient function for the analysis of vibration induced time wave form data. The autocorrelation function data generally are computed from the same time wave form data used to compute the spectrum. The strengths of the autocorrelation data are complimentary to the strengths of the spectral data. This course makes use of both case studies from real-life examples of common faults and live demonstrations illustrating specific mounting procedures to reliably detect certain faults. The difference between PEAKVUE techniques and demodulation will also be demonstrated.

Topics
- Proper PEAKVUE™ Set-Ups for all Speeds (as Low as 1 rpm)
- Sensor Selection and Sensor Mounting
- Setting Alarm Levels
- Choosing Trend Parameters
- Analyzing PEAKVUE™ Spectra and Waveforms
- Uses of the Circular Waveform Plot
- Introduce the Autocorrelation Coefficient
- Demonstrate the Computation of the Autocorrelation Coefficient Data from the Time Wave form Data
- Highlight the Strengths of the Autocorrelation Coefficient Function Data/Spectra Data
- Demonstrate the use of the Autocorrelation Coefficient Data as a Diagnostic Tool to Support the Spectra Data for Vibration Analysis Through Several Case Studies
- Identify Unique Patterns of the Autocorrelation Function Data for Certain Classes of Bearing Faults, Gearing Faults, etc.

Audience
Key learning topics will include database setup, transducer selection and mounting (best practices), and accurate deficiency identification of reciprocating engine and compressor faults as related to crankshaft angle.

- Overview of reciprocating equipment in various industries
- Operation
- Component familiarization
- Database setup
- Proper transducer selection
- Best practices for data collection
- Data analysis
- Case studies/examples

Prerequisites
Anybody who wishes to monitor reciprocating equipment using Emerson's AMS 2140 and AMS Machinery Manager Software

Machinery Health - Reciprocating Equipment Analysis – 2050 CEUs – 2.1

Overview
This 3-day course will familiarize students with the advantages of condition monitoring of reciprocating equipment using Emerson's AMS 2140 analyzer. This course will also demonstrate how to correctly setup databases to accurately diagnose equipment faults and possible deficiencies.

Topics
Key learning topics will include database setup, transducer selection and mounting (best practices), and accurate deficiency identification of reciprocating engine and compressor faults as related to crankshaft angle.

- Overview of reciprocating equipment in various industries
- Operation
- Component familiarization
- Database setup
- Proper transducer selection
- Best practices for data collection
- Data analysis
- Case studies/examples

Audience
Anybody who wishes to monitor reciprocating equipment using Emerson's AMS 2140 and AMS Machinery Manager Software

Prerequisites
Students should be familiar with the AMS 2140 and AMS Machinery Manager software.
### Machinery Health™ - Windows- Based ODS/Modal - Introduction - 2039
**CEUs - 2.8**

**Overview**
This 4-day course is designed to teach Operating Deflection Shape (ODS) and Modal Analysis software. This course uses the CSI 2130 or AMS 2140 single- and dual-channel Machinery Health™ Analyzers to teach the practical concepts of ODS/modal measurement techniques and display options. The modal course is introductory and will not cover theory or mathematical background.

**Topics**
- Building of the Wireframe Model
- Measurement Considerations
- Collecting ODS Data With and Without a Tachometer Reference
- Utilizing an Impact Hammer with the CSI 2130 or AMS 2140 Advanced Dual-Channel DLP
- Interpretation of Results

**Prerequisites**
Knowledge of dual-channel analyzers and at least one year of full-time vibration analysis experience is recommended.

### Machinery Health™ - Balancing Theory & Application for AMS 2140 - 2016
**CEUs - 2.8**

**Overview**
This 4-day class (2 days on Balancing Theory and 2 days on Balancing Applications with AMS 2140) teaches how to perform single- and dual-plane balancing using both graphical and analyzer-based balancing methods. The class uses the AMS 2140 Machinery Health™ Analyzer on lab machinery.

**Topics**
- Imbalance identification
- Use of vectors
- Calculating influence coefficients
- Use of the auxiliary analyzer balance functions
- Use of UltraMgr module
- Calculating a system lag
- Estimate trial weights
- Balancing flexible rotor systems
- Balancing overhung rotors
- Applying balancing techniques in an industrial setting

**Prerequisites**
Understanding of vibration analysis is recommended.

### Machinery Health™ - Laser Alignment for AMS 2140 - 2096
**CEUs - 1.8**

**Overview**
The 2.5-day course provides training on shaft alignment using Emerson’s laser alignment product line with focus on the AMS 2140 Machinery Health™ Analyzer. This course includes hands-on training with horizontal alignment and vertical alignment demonstrators and covers management of an alignment program using the AMS Machinery Manager software.

**Topics**
- Alignment: What is it? Why?
- Required pre-shutdown checks
- Pre-alignment checks and corrections
- The science and art of alignment
- Tools & techniques for moving equipment
- Time-savers
- User of CSI laser alignment product line with AMS 2140 Machinery Health™ Analyzer
- Alignment information
- Management systems: methods and advantages

**Audience**
This 2.5-day class is intended for personnel who have limited or no alignment experience.

### Machinery Health™ - Online Prediction Operation and Maintenance – 2088
**CEUs - 2.8**

**Overview**
This 4-day course best suits those who have a CSI 4500, AMS 6500, AMS 2600 or XP32 system installed and operational prior to attending the course.

**Topics**
- Vibration basics and terminology relating to the CSI 4500, AMS 6500, AMS 2600 or XP32
- System overview: functionality and system components
- Online Watch - used to monitor the system daily
- Online Config - adding a new machine to an existing database
- Vibration Analysis Module - spectrums, waveforms and trend data
- PEAKVUE® technology Processing
- Transient setup and capture evaluation
- Review of customer databases

**Audience**
System users or analysts
- Personnel using the CSI 4500, AMS 6500, AMS 2600 or XP32 daily
- Those responsible for configuring databases and analyzing data

### Machinery Health™ - Online Protection Operation and Maintenance– 2080
**CEUs - 2.1**

**Overview**
This 3-day course is a hands-on training for anyone involved with operating and maintaining an Online Protection System. Workshops include practice with “live” monitors and racks.

**Topics**
- Overview of hardware components
- Rack configuration Operator display software
- Data acquisition software Interface with the CSI On-line prediction system
- System troubleshooting and maintenance.

**Audience**
This 3-day course is a hands-on training for anyone involved with operating and maintaining an AMS 6500 Protection System.
**Machinery Health™ - AMS 6500 ATG Operation and Maintenance – 2086 CEUs - 2.1**

**Overview**
This 3-day hands-on training course is for any user or analyst involved with operating and maintaining a AMS 6500 ATG System. Workshops include practice with module and software configuration.

**Topics**
- Overview of hardware and modules
- Rack and module configuration
- Machine Studio software functionality, navigation and configuration
- System troubleshooting and maintenance
- ATG View App

**Audience**
This 4-day course is a hands-on training for anyone involved with operating and maintaining a AMS6500 ATG System.

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**Machinery Health™ - Lubrication Level 1 & Level 2 - 2082 CEUs - 2.1**

**Overview**
Guidelines and instruction for starting an oil analysis program will be provided in this 3-day course. The course focuses on the basic properties of lubricants and lubricant specifications including additive packages. An overview of laboratory testing methods and interpretation of test data is taught. In addition, instruction is provided on proper storage and handling of new, unused lubricants, as well as sample point identification and best practices for collecting samples from machinery. Basic contamination control and wear debris analysis and identification is covered. The focus of the level two portion of the course is the use of oil analysis with other predictive technologies to enhance a machinery health program. Machine life extension and reduction of unscheduled downtime will be covered in depth. Training includes introductions to lubricant engineering, failure concepts, and failure prevention. Information will be provided on greases and synthetic lubricants, including advantages and applications. The importance of Wear Debris Analysis and contamination control and their impact on reliability will be stressed. Guidelines and step-by-step procedures will be offered for consolidating lubricants, setting alarm limits, as well as managing and enhancing existing lubrication programs. Optional Level I & Level II Lubrication Certification exams will be administered at the end of the course for no charge.

**Topics**
- The productive lubricant analysis program
- Analyzing oil data
- Identifying common types of wear debris, their origins, and corrective actions
- The importance of contamination control
- Designing sampling, storage and handling procedures
- The components of RBM lubrication program
- Methods for extending machine life
- The importance of Wear Debris Analysis and
- Contamination Control
- Lubricant consolidation
- Establishing alarms

**Audience**
This course is designed for individuals who have limited or no oil analysis experience.

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**Machinery Health™ - Wear Debris Analysis Workshop – 2084 CEUs - 1.4**

**Overview**
Wear debris analysis is often referred to as the most important form of oil analysis. This 2-day course teaches how to apply conditions such as the environment and other outside factors to make an accurate root cause analysis. Attendees gain a basic understanding of wear particle generation, sample preparation techniques, identification and characterization of wear particles. Data generated using the OilView® instrumentation and how it applies to WDA is discussed as well as the use of the OilView® WDA module. WDA skills must be maintained by the student through regular practice and may be developed by reading further on the subject.

**Topics**
- Theory Presentation
- Wear Particle Generation
- Tribology, Friction, and Wear
- Lubrication Fundamentals
- Sample Screening: Discussion of How to Use Preliminary Data and Equipment type to Select WDA Candidates and Sample Preparation Techniques
- Interpretation of Oil Analysis Results Related to WDA such as OilView Indices and Commercial Oil Laboratory Data
- Sample Preparation Techniques: Discussion of Sample Preparation for Grease, Oil, Hydraulic Fluid, and Synthetics
- Disciplined and Systematic Approach to WDA: Overview of the OilView WDA Module
- Particle Identification and Characterization Exercise
- Identification and Characterization of Wear Debris
Machinery Health™ - Electric Motor Diagnostics & Basic MotorView – 2081
CEUs - 2.8

Overview
This 4-day course is intended for personnel who are experienced in vibration analysis and diagnostics and focuses on the theoretical concepts of motor diagnostics. This course uses labs and case histories to demonstrate the functionality of the MotorView software in determining rotor bar defects using current and flux data. This course is designed for mechanical and electrical skilled personnel who may not have a background in motor theory, operation and construction.

Topics
- Basic electrical principles
- AC/DC motor theory and design
- Variable frequency drives
- Data collection methods
- Current spectra and waveform analysis
- Flux spectra analysis and data evaluation
- Temperature data
- Shaft current
- Analysis of case histories
- Windows configuration for MotorView operation

Audience
The MotorView course is designed for students who are experienced in vibration analysis and diagnostics and focuses on the theoretical concepts of motor diagnostics.

Machinery Health™ - Turbomachinery Diagnostics – 2089
CEUs - 2.8

Overview
This 4-day class covers details of the operation, maintenance, management, diagnostics and design of rotating machinery using vibration information. Emphasis is placed on interpreting start-up/shutdown and steady state vibration data plots, understanding the sources of rotating machinery vibration and recognizing common machinery malfunctions. This seminar makes extensive use of full featured field diagnostic equipment to reinforce lecture topics. This class is designed for engineers, supervisors, managers, and rotating equipment support professionals responsible for design, operation, and maintenance of rotating equipment. Case histories will be presented to reinforce class topics and facilitate class discussion. The operation, maintenance, management, diagnostics and design of rotating machinery using vibration information.

Machinery Health™ - Time Waveform Analysis – 2051
CEUs – 2.1

Overview
This 3-day course is designed to upgrade and enhance waveform analysis skills for vibration technician and reliability engineers. There are several reasons that vibration analysts want to understand and use waveform analysis, since some significant defects are better analyzed in the time domain. The time domain provides visual confirmation of amplitude enhancement and reduction. Time waveform analysis can present, in a static picture, amplitude variations and changes in frequencies that the FFT cannot display without using multiple (dynamic) graphics. Further, a waveform graphically presents accurate peak vibration amplitudes representing defect severity.

Topics
- Waveform Data Acquisition: Analog to Digital Conversion (A/D)
- Waveform Parameters for Trending: Peak to Peak, Crest Factor, and Analog Overall
- Waveform Tools: Revolution Markers, Difference Frequency markers, Phase, Peak, RMS, Crest Factor
- Waveform Patterns: Sinusoidal, Impacting, Truncated, Asymmetric, Transient/Random, Modulated and Discontinuity or Bad/Compromised Data.
- FFT vs. Waveform: Benefits and limitations of each

Audience
Vibration technicians and reliability engineers

Prerequisites
Intermediate vibration analysis or eighteen-month vibration related field experience is recommended.
METCO - Hydrocarbon Liquid and Natural Gas Flow Measurement - M2650 CEUs - 2.4

Overview
This 3-day course addresses the concepts of custody transfer metering, principle of allocation in shared facilities, and the general operating principles of custody transfer instruments in both Natural Gas and Hydrocarbon Liquid Flow Metering.

Topics
- Why Meter?
- Traceability
- Uncertainty
- Allocation
- Flow Computer Overview
- Liquid Metering
- Meter Proving
- The Fast Loop
- Liquid Densitometers
- Automatic Sampling
- BS&W
- Gas Metering
- Gas Characteristics
- Gas Flow Meters
- Gas Metering Instrumentation
- The Gas Densitometer
- The Gas Chromatograph
- Dewpoint
- Wet Gas Metering
- The Audit Trail
- Procedures

Audience
This course is intended for those who are involved with metering but may not be working with metering but have an involvement that requires an insight into metering to carry out their own job. Typical job functions include: plant operators and technical assistants. But is also applicable to: line managers, supervisors, engineers, commercial analysts and hydrocarbon accountants.

Prerequisites
A basic knowledge of metering operations or maintenance is necessary for attendance for this course.

METCO - Measurement Auditor Training - M2666 CEUs - 2.8

Overview
This 4-day course is designed to give an outcome such that the candidate will be able to carry out shadowed audits and go on to complete 3rd party audits.

Topics
- Introduction to Auditing
- The Audit Body
- The Auditor
- The Audit Process
- Audit Criteria
- HM 60- Guidelines for Auditing of Measurement systems
- Auditor Responsibilities

Audience
This course is intended for those who carry out audits on flow measurement systems. Typical job functions: senior measurement specialists, measurement engineers, measurement consultants.

Prerequisites
Before this training course the candidate will have successfully completed the ISO 9001 Lead Auditors training.

METCO - Metering Appreciation for Operators - M2610 CEUs - 0.8

Overview
This 1-day course delivers an overview understanding of custody transfer flow measurement, together with the basic concepts of metering techniques and the function of flow computers.

Topics
- Why Meter?
- Metering Techniques
- Understanding Flow Computers
- Allocation Appreciation
- Reporting Procedures
- The Audit Trail. Operating
- Fault Conditions

Audience
This course is intended for those who are not working with metering but have an involvement that requires an insight into metering to carry out their own job. Typical job functions include: plant operators and technical assistants. Also applicable to: line managers, supervisors, engineers, commercial analysts and hydrocarbon accountants.

Prerequisites
No specialist metering knowledge is necessary for attendance on this course.

METCO - Measurement Auditor Appreciation Course - M2665 CEUs - 1.6

Overview
This 2-day course is designed to give appreciation of the audit process.

Topics
- Introduction to Auditing
- Why Audit
- Audit Types
- The Audit Body
- ISO 9001 — Quality Management
- Measurement System Risk
- The Audit Process
- Audit Criteria
- Auditor Responsibilities
- Conducting the Audit
- Audit Reporting and Follow-up

Audience
This course is intended for those who arrange and deal with auditors carrying out audits on flow measurement systems, who have to respond to audit findings and represent their companies whilst witnessing an audit. Typical job functions: measurement specialists, measurement engineers, measurement consultants, contract managers, operations managers.

Prerequisites
A level of measurement knowledge will be required.

METCO - Hydrocarbon Liquid Flow Measurement - M2630 - Continued...

- Liquid Densitometers
- Automatic Sampling
- BS&W
- Reporting Procedures
- The Audit Trail
- Fault Conditions

Audience
This course is intended for those who are not working with metering but have an involvement that requires an insight into metering to carry out their own job. Typical job functions include: plant operators and technical assistants. Also applicable to: line managers, supervisors, engineers, commercial analysts and hydrocarbon accountants.

Prerequisites
A basic knowledge of metering operations or maintenance is necessary for attendance for this course.
METCO - Metering Appreciation for Supervisors - M2620
CEUs - 0.8

Overview
This 1-day course delivers an overview understanding of custody transfer flow measurement, together with the basic concepts of metering techniques and the function of flow computers.

Topics
- Why Meter?
- Metering Techniques
- Understanding Flow Computers
- Allocation Appreciation
- Metering Management
- Choice of Meter
- The Audit Trail

Audience
This course is intended for those who are not working with metering but have an involvement that requires an insight into metering to carry out their own job. Typical job functions include: plant operators, supervisors, engineers, commercial analysts and hydrocarbon accountants.

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METCO - Metering Technician Training - M2667
CEUs - 2.4

Overview
This 3-day course addresses the diverse knowledge requirements of the Metering Technician across various trades such as instrumentation, computers, analysts maintenance and calibrations.

Topics
- Oil and Gas Process
- Flow Meters (Orifice, Turbine, Coriolis, Venturi, Magflow, Vortex)
- Pressure, Temperature Differential Pressure
- Density
- Oil and Gas Sampling
- BS & W Measurement
- Chromatography
- Flow Computers
- Reports
- Planned Maintenance
- Calibrations
- Calibration Software
- Logistics and Spares Management
- P & ID's
- Loop Diagrams

Audience
The course delivers an overall understanding of oil and Gas process, custody transfer metering and the role and responsibilities of the Metering technician.

Prerequisites
A certain level of instrument knowledge is expected for this course.

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METCO - Natural Gas Flow Measurement - M2640
CEUs - 1.6

Overview
This 2-day course addresses the concepts of custody transfer metering, principle of allocation in shared facilities, and the general operating principles of Natural Gas Custody Transfer Instruments.

Topics
- Why Meter?
- Traceability
- Uncertainty
- Allocation
- Flow Computer Overview
- Gas Characteristics
- Gas Flow Meters
- Gas Flow Metering Instrumentation
- The Gas Densitometer
- The Gas Chromatograph
- Dewpoint
- Wet Gas Metering
- Reporting Procedures
- The Audit Trail
- Operating Procedures
- Fault Conditions

Audience
This course is intended for those who are involved with Metering but may not be Metering Specialists. Typical job functions include: maintenance technicians, supervisors and engineers.

Prerequisites
A basic knowledge of metering operations or maintenance is necessary for attendance for this course.
Micro Motion - Coriolis & Rosemount 8700 Magnetic Flowmeters – 2384
CEUs - 0.7

Overview
This 1-day field class provides hands-on training on both the Coriolis and Magnetic Flowmeters. Typically, 2/3 of the course time is spent on Micro Motion's Coriolis meter and 1/3 on Rosemount's 8700 Magnetic Flowmeter. Theory of operation, meter components and installation of each flowmeter are covered. The focus of the class is to provide a hands-on experience configuring and troubleshooting best practices. Students will learn the Micro Motion Series 1000/2000 transmitters using one of these configuration tools; Prolink III, HC475, AMS Device Manager or Series 3000 display interface devices. Public field classes typically use Prolink III for configuring the Micro Motion transmitters and the HC475 will be used for the Rosemount 8700 Magnetic flowmeter. Customers can choose which configuration device is used for classes held at their site.

Topics
After attending the course, the student will be able to do the following for both Micro Motion's Coriolis and Rosemount 8700 Magnetic flowmeters:

• Briefly Explain the Fundamentals for How Each Flowmeter Works and the Function of the Key Components
• Basic Understanding of the Installation Best Practices for Orienting, Mounting and Wiring the Sensor and Transmitter
• Perform a Basic Configuration of the Metering System for Various Applications
• Diagnose and Know How to Correct the Most Common Meter and Process Issues

Audience
This combined class is intended anyone that is involved with properly configuring and troubleshooting a Micro Motion flow and density meter and Rosemount 8700 Smart Magnetic Flowmeters. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
Some prior experience working with Micro Motion Coriolis & Rosemount 8700 Magnetic flowmeters is recommended. However, students with no past experience can also benefit. A basic understanding of the fundamentals of flow measurement, electricity, analog and frequency signal processing is assumed.

Micro Motion - Coriolis & Rosemount 8800 Vortex Flowmeters – 2387
CEUs - 0.7

Overview
This 1-day field class provides hands-on training on both the Coriolis and Vortex Flowmeters. Typically, 2/3 of the course time is spent on Micro Motion's Coriolis meter and 1/3 on Rosemount's 8800 Vortex Flowmeter. Theory of operation, meter components and installation of each flowmeter are covered. The focus of the class is to provide a hands-on experience configuring and troubleshooting best practices. Students will learn the Micro Motion Series 1000/2000 transmitters using one of these configuration tools; Prolink III, HC475, AMS Device Manager or Series 3000 display interface devices. Public field classes typically use Prolink III for configuring the Micro Motion transmitters and the HC475 will be used for the Rosemount 8800 Vortex flowmeter. Customers can choose which configuration device is used for classes held at their site.

Topics
Students will be able to do the following for both Micro Motion's Coriolis and Rosemount 8800 Vortex flowmeters:

• Briefly Explain the Fundamentals for How Each Flowmeter Works and the Function of the Key Components
• Have a Basic Understanding of the Installation Best Practices for Orienting, Mounting and Wiring the Sensor and Transmitter
• Perform a Basic Configuration of the Metering System for Various Applications
• Diagnose and Know how to Correct the Most Common Meter and Process Issues
• Configure the Metering System to Measure Available Process Variables from the Device for Their Application
• Learn a Step by Step Process to Perform Basic Troubleshooting of the Most Common Meter and Process Issues

Audience
This combined class is intended anyone that is involved with properly configuring and troubleshooting a Micro Motion flow and density meter. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
Some prior experience with Micro Motion Coriolis & Rosemount 8800 Vortex

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flowmeters. A basic understanding of the fundamentals of flow measurement, electricity, analog and frequency signal processing.

Micro Motion - Coriolis 1000/2000 Training Class – 2358
CEUs - 0.7

Overview
This one-day course consists of a blend of lectures and hands-on exercises that cover the installation, configuration, calibration checks and troubleshooting of Micro Motion sensors with the Series 1000/2000 transmitters and peripherals. This course includes hands-on exercises. Courses held at customer specified sites can be customized to address specific transmitters and configuration tools. Public registration classes cover a broader range of equipment based on the needs of the attendees.

After completing this training, students will also get unlimited access to the Micro Motion’s Online Training (e2353) for a year. This online training cost $40/license per year if purchased separately.

Topics
• Explain the Fundamentals for how a Micro Motion Coriolis Meter Works and the Function of the Key Components
• Be able to apply the installation best practices for orienting, mounting and wiring the sensor and transmitter
• Configure the Metering System to Measure Available Process Variables from the Device for Their Application
• Learn a Step by Step Process to Perform Basic Troubleshooting of the Most Common Meter and Process Issues

Audience
This course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Micro Motion Coriolis flow and density meter. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
A basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing is assumed.
Micro Motion - Coriolis Comprehensive Factory Training Class – 2352
CEUs - 2.1

Overview
This three-day class consists of a blend of lectures and hands-on exercises that cover the installation, configuration, and calibration of the Micro Motion metering system. Students will learn the Series 1000/2000 transmitters using ProLink® III, HC475 and the Series 3000 interface devices. Students will perform a master reset and use ProLink III to configure the Series 1000/2000, perform a flow calibration and solve troubleshooting problems. On the third day, based on student need, we will cover one or all of the following topics: RFT9739 transmitter, T-Series, R-Series and Series 3000 platform and an introduction to the new Micro Motion’s 5700’s transmitter. Students will also learn the Modbus communications model, including RS-485 network requirements, memory structure, data types, functions, character framing, and message framing.

After completing this training, students will also get unlimited access to the Micro Motion’s Online Training (e2353) for a year. This online training cost $400/license per year if purchased separately.

Topics
After attending this course the student will be able to do the following:
- Be able to explain the fundamentals for how a Micro Motion Coriolis meter works and the functions of the key components
- Be able to apply the installation best practices for orienting, mounting and wiring the sensor and transmitter
- Be able to configure the metering system to measure flow, density and temperature for the application
- Be able to apply a step-by-step process to perform basic troubleshooting for the most common meter and process issues
- Be able to explain the fundamentals for the Modbus protocol model.
- Be able to configure, commission, read process data, view & analyze key diagnostic registers and loop test a batch application using a Micro Motion Meter.

Audience
This class is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Micro Motion Coriolis flow and density meter. Typical job functions include; maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
None required. However, basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing are assumed.

Micro Motion - Coriolis Comprehensive Factory Training Class – 2352 – Continued...

Micro Motion - Coriolis Comprehensive
Field Based Training Class – 2380
CEUs - 1.4

Overview
This two-day class is modeled after the 2352 factory course. It consists of a blend of lectures and extensive hands-on exercises that cover the installation, configuration and calibration of the Micro Motion metering system. Students will learn the Series 1000/2000 transmitters using either ProLink® III, AMS Device Manager, HC475 or L.O.I. Students will perform a master reset, configure the Series 1000/2000, perform a flow calibration and solve troubleshooting problems. Based on student need, we will cover one or all of the following topics: RFT9739, 9739MV\D transmitter, T-Series, R-Series, or Series 3000 platform. Onsite classes can be customized to cover the customer’s installed base, preferred configuration tools and application questions. This course also includes an introduction to Micro Motion’s new 5700 transmitter. After completing this training, students will also get unlimited access to the Micro Motion’s Online Training (e2353) for a year. This online training cost $400/license per year if purchased separately.

Topics
- Explain the Fundamentals for how a Micro Motion Coriolis Meter Works and the Function of the Key Components
- Learn the Installation Best Practices for Orienting, Mounting and Wiring the Sensor and Transmitter
- Configure the Metering System to Measure Flow, Density and Temperature for Various Applications
- Learn a Step by Step Process to Perform Basic Troubleshooting of the Most Common Meter and Process Issues

Audience
This class is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Micro Motion Coriolis flow and density meter. Typical job functions include; maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
Basic understanding of the fundamentals of flow measurement, electricity, analog and frequency signal processing are assumed.

Micro Motion - Coriolis Meter: Configure Device Options & Meter Information - e2359

Overview
$99 per student - unlimited access 12 months.

Micro Motion - Coriolis Meter: Configuring Process Measurements - e2357

Overview
This online training includes:
Communicating Between Tools and Transmitter; Navigation of Configuration Tool Menus; Characterizing the Flowmeter Configuring Flow Measurements; Flow Direction and Dampening; Density Measurement and Slug Flow Limits and Configuring Temperature$99 per student - unlimited access 12 months.

Micro Motion - Coriolis Meter: Final Checkout - e2360

Overview
$99 per student - unlimited access 12 months
Micro Motion - Coriolis Meter: Installation Best Practices - e2355
CEUs - 0.10
Overview
(English, Spanish, German & Chinese versions available)
This online training includes: Understand the considerations for determining sensor and transmitter location in a process; how to determine the best sensor orientation based on the application; understand best practices for mounting the sensor $99 per student - unlimited access 12 months.

Micro Motion - Coriolis Meter: Theory of Operation - e2354
CEUs - 0.10
Overview
(English, Spanish, German & Chinese versions available) This online training is $99 per student - unlimited access 12 months.
Topics
- Understand how a Coriolis meter works
- Understand the basic physics behind what the Coriolis Force is, how a Coriolis Sensor uses that principle to measure mass flow directly
- Understand how a Coriolis sensor simultaneously measures the density and temperature of the process fluid passing through it

Micro Motion - Coriolis Meter: Theory of Operation (German) - e2354G
CEUs - 0.10
Overview
Nach Abschluss dieses Moduls sind Sie in der Lage:
- Ueberlegung zum Bestimmen des Einbauortes von Sensor und Auswerte-Elektronik in den Anlagenteil zu nennen
- Die je nach Anwendung optimale Sensorausrichtung zu bestimmen
- Die empfohlenen Methoden zum Montieren des Sensors zu nennen

Micro Motion - Coriolis Meter: Theory of Operation (Spanish) - e2354E
CEUs - 0.10
Overview
Después de completar el tutorial, usted debe ser capaz de:
- Identificar y describir los principales componentes funcionales de un medidor de caudal tipo Coriolis de Micro Motion.
- Explicar los componentes físicos de un sensor y un transmisor Coriolis.
- Explicar cómo un medidor de caudal tipo Coriolis mide caudal másico.
- Explicar cómo un medidor de caudal tipo Coriolis mide caudal volumétrico.
- Explicar cómo un medidor de caudal tipo Coriolis mide densidad.

Micro Motion - Coriolis Meter: Wiring & Navigating Tools - e2356
CEUs – 0.1
Overview
This online training includes: Wiring Sensor to Transmitter; Connecting Power and Powering the Transmitter; Wiring the Configuration Tools to the Transmitter & more $99 per student - unlimited access 12 months.
### Topics
- Coriolis Meter Fundamentals
- Wiring Sensor to Transmitter
- Connection & Use of Configuration Tools with 2700 Transmitter
- Configure Process Measurements
- Integrate the Meter with the Control/Operating System
- Configure Device Options & Meter Information
- Final Checkout

### Audience
This eLearning course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Micro Motion flow and density meter connected to a Series 2000 Transmitter. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers. It can be taken as a full curriculum with assessments. Students that view all of the content and successfully complete the assessments can print out a Certificate of Completion with CEU's awarded. The content can also be used as just-in-time refresher material after attending one of our instructor lead training classes.

### Prerequisites
None required. However, basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing are assumed.

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### Topics
- Coriolis Meter Fundamentals
- Wiring Sensor to Transmitter
- Connection & Use of Configuration Tools with 2700 Transmitter
- Configure Process Measurements
- Integrate the Meter with the Control/Operating System
- Configure Device Options & Meter Information
- Final Checkout

### Audience
This eLearning course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Micro Motion flow and density meter connected to a Series 2000 Transmitter. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers. It can be taken as a full curriculum with assessments. Students that view all of the content and successfully complete the assessments can print out a Certificate of Completion with CEU's awarded. The content can also be used as just-in-time refresher material after attending one of our instructor lead training classes.

### Prerequisites
None required. However, basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing are assumed.

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### Topics
- Coriolis Meter Fundamentals
- Wiring Sensor to Transmitter
- Connection & Use of Configuration Tools with 2700 Transmitter
- Configure Process Measurements
- Integrate the Meter with the Control/Operating System
- Configure Device Options & Meter Information
- Final Checkout

### Audience
This 1-day course consists of a blend of lectures and hands-on exercises that cover the installation, configuration, calibration checks and troubleshooting of Micro Motion ELITE, F-Series and D sensors with the RFT9739 or 9739MVD transmitters and peripherals. This course includes hands-on exercises. Courses held at customer specified sites can be customized to address specific transmitters and configuration tools. Public registration classes cover a broader range of equipment based on the needs of the attendees.

### Topics
- Explain the Fundamentals for how a Micro Motion Coriolis Meter works and the Function of the Key Components
- Learn the Installation Best Practices for Orienting, Mounting and Wiring the Sensor and Transmitter
- Configure the RFT9739 or 9739MVD to Measure Flow, Density and Temperature for Their Application
- Learn a Step by Step Process to Perform Basic Troubleshooting of the Most Common Meter and Process Issues

### Audience
This course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Micro Motion Coriolis flow and density meter. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers

### Prerequisites
None required. However, basic understanding of the fundamentals of the behavior/properties of gases and gas density measurement are helpful. Basic electricity, analog & frequency signal processing knowledge are also assumed.
**Micro Motion - Coriolis Short Course - 2339C**

**Overview**
This half day course is a condensed version of the 2358 course. This course briefly reviews the theory of operation, meter components and installation. The focus of the class is to provide a hands-on experience configuring the Micro Motion metering system. Students will learn the Series 1000/2000 transmitters using one of these configuration tools: ProLink III, HC475, AMS Device Manager or the local operator interface. Public classes typically use ProLink III. Customers can choose which device is used for classes held at their site. This course also includes an introduction to Micro Motion’s new 5700 transmitter.

After completing this training, students will also get unlimited access to the Micro Motion’s Online Training (e2353) for a year. This online training cost $400/license per year if purchased separately.

**Topics**
- Briefly Explain the Fundamentals for How a Micro Motion Coriolis Meter Works and the Function of the Key Components
- Have a basic understanding of the Installation Best Practices for Orienting, Mounting and Wiring the Sensor and Transmitter
- Perform a Basic Configuration of the Metering System to Measure Flow, Density and Temperature for Various Applications
- Diagnose and Know how to Correct the Most Common Meter and Process Issues

**Audience**
This class is intended as a refresher course for anyone that is involved with properly configuring and troubleshooting a Micro Motion flow and density meter. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers. This class is also intended to be taught as two, 1/2-day repeat sessions to accommodate customers who need to train their entire department but must also maintain the operation of their plant by scheduling their employees between an AM/PM training sessions.

**Prerequisites**
Some prior experience working with Micro Motion Coriolis meters is recommended. Students with no past experience can benefit if their learning objectives are to get a basic intro to operation, installation, configuration and troubleshooting. For all attendees, it is assumed they have a basic understanding of the fundamentals of flow measurement, electricity, analog and frequency signal processing.

**Micro Motion - Coriolis, Magnetic & Vortex Wireless – 2383**

**Overview**
This 1-day course consists of a blend of lectures and hands-on exercises that cover a basic overview of wireless capabilities with a Micro Motion Coriolis, Rosemount 8700 Series Magnetic and 8800 Series Vortex meters. Based on customer need, the class can be taught for each of the individual products. The course provides a step by step process for the following: how to install and wire a 775 Smart Wireless THUM to each transmitter, how to configure the THUM, how to configure the 1420 Wireless Gateway to the THUM using AMS Device Manager and how to add and view the Micro Motion and Rosemount transmitters to the gateway.

**Topics**
- Explain the Fundamentals for how a Micro Motion Coriolis, Rosemount 8700 Series Magnetic & 8800 Series Vortex Flowmeters Work with a 1420 Wireless Gateway and 775 Smart THUM Adapter
- Install and Wire a 775 Smart THUM to Micro Motion and Rosemount Transmitters
- Connect to and Configure the Micro Motion and Rosemount Transmitters to work with a 1420 Wireless Gateway
- Configure a 775 Smart THUM and the Transmitters to Communicate on the Gateway using AMS Device Manager

**Audience**
This course is intended for anyone that is involved with installing, wiring, configuring and troubleshooting a Micro Motion Coriolis, Rosemount 8700 Magnetic & 8800 Vortex flowmeters with a 775 Wireless THUM. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers.

**Prerequisites**
General understanding of the HART® protocol and operation and configuration of a Micro Motion Coriolis, Rosemount 8700 Magnetic and 8800 Vortex meters is assumed.

**Micro Motion - Density and Viscosity Product Training – 5708**

**Overview**
This two-day course consists of a blend of lectures and hands-on exercises that cover the installation, configuration, calibration checks and troubleshooting of Micro Motion transmitters and peripherals. Courses held at customer specified sites can be customized to address specific transmitters and configuration tools. Public registration classes cover a broader range of equipment based on the needs of the attendees.

**Topics**
After attending this course, the student will be able to do the following:
- Explain the principle of operation for how a Micro Motion Density & Viscosity meter works and the function of the key components.
- Apply the installation best practices for orienting, mounting and wiring the sensor and transmitter.
- Configure the metering system to measure flow, density and temperature for their application.
- Apply a step by step process to perform basic troubleshooting of the most common meter and process issues.
Overview
This two-day course consists of a blend of lectures and hands-on exercises that cover the installation, configuration, calibration checks and troubleshooting of Micro Motion transmitters and peripherals. The course includes hands-on exercises within the Interactive Plant Environment training facility. Customer exclusive classes can be customized to address specific transmitter and configuration tools specific to that customer. This course also includes an introduction to Micro Motion's new 5700 transmitter.

Topics
After attending this course, the student will be able to do the following:

- Explain the principle of operation for how a Micro Motion Coriolis meter works and the function of the key components.
- Apply the installation best practices for orienting, mounting and wiring the sensor and transmitter.
- Configure the metering system to measure flow, density and temperature for their application.
- Apply a step by step process to perform basic troubleshooting of the most common meter and process issues.
- Experience hands on simulated plant environment with operating flow meters.

Overview
This 1/2-day class consists of a blend of lectures and hands-on exercises. Students will learn the Modbus communications model, including RS-485 network requirements, memory structure, data types, functions, character framing, and message framing. Students will use Micro Motion’s Modbus documentation set and Modbus tool to configure transmitter features, read process data, reset totals, read and acknowledge alarms, analyze diagnostic registers, zero the flowmeter, perform a loop test and manage a batch process. Troubleshooting will also be covered.

Topics
- Explain the Fundamentals for the Modbus Protocol Model
- Configure, Commission, Read Process Data, View and Analyze Key Diagnostic Registers and Loop Test a Batch Application using a Micro Motion Meter
- Set up a Host System or PLC to Communicate with a Micro Motion Transmitter via Modbus

Audience
This course is appropriate for personnel who have any of the following responsibilities: installing a Micro Motion transmitter on an RS-485 network, configuring, calibrating, operating, or troubleshooting a Micro Motion transmitter using Modbus protocol, setting up a Modbus host or PLC to communicate with a Micro Motion transmitter or writing programs that use Modbus protocol to communicate with Micro Motion transmitters.

Prerequisites
Students should have completed Micro Motion Comprehensive Product Training, Course 2352, or have equivalent knowledge or experience.
Micro Motion - Series 5700 Transmitters – Short Course – 5711
CEU - .4

Overview
This half day course consists of a blend of lectures and hands-on exercises that cover the installation, configuration, calibration checks and troubleshooting of Micro Motion sensors with the Series 5700 transmitters and peripherals. This course includes hands-on exercises. Courses held at customer specified sites can be customized to address specific transmitters and configuration tools. Public registration classes cover a broader range of equipment based on the needs of the attendees.

After completing this training, students will also get unlimited access to the Micro Motion’s Online Training (e2353) for a year. Applicable only for public registration. This online training cost $400/license per year if purchased separately.

Topics
After attending this course, the student will be able to do the following:

• Be able to explain the principle of operation for how a Micro Motion Coriolis meter works and the function of the key components.
• Be able to apply the installation best practices for orienting, mounting and wiring the sensor and transmitter.
• Be able to configure the metering system to measure flow, density and temperature for their application.
• Be able to apply a step by step process to perform basic troubleshooting of the most common meter and process issues.

Audience
This half day course is intended as a refresher or a four hour introduction for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Micro Motion Coriolis flow and density meter. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
This being a four-hour class, some prior experience working with Micro Motion meters is recommended. Students with no prior experience can also benefit from this course to provide a basic introduction. However, a basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing are assumed.

Micro Motion - 5700 Ethernet Transmitter Factory Training Class – 5712
CEU - .7

Overview
This one-day course consists of a blend of lectures and hands-on exercises that cover the installation, configuration and ethernet connection using the 5700 Ethernet transmitter. Additional common tasks like using Smart Meter Verification and downloading the Historian files for analysis are included. Emphasis is on how to tell if the transmitter is working and what to do when it is not working.

Topics
Learning Objectives: After attending this course the student will be able to do the following:

• Be able to install and power up the 5700 Ethernet transmitter.
• Be able to connect the transmitter to the ethernet network using existing topology
• Be able to configure the IP address as defined by the network administrator.
• Be able to connect to the on-board web server in the 5700 and configure the instrument.
• Be able to troubleshoot the network connection to determine if the transmitter is working properly.
• Be able to recognize common problems with the ethernet network and how to resolve them.

Audience
This one-day course is intended for anyone who may be tasked with the installation, maintenance or commissioning of the 5700 Ethernet transmitter.

Prerequisites
5700 Transmitter class (course # 5710 or 5711) or equivalent experience. A basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing is assumed.

Micro Motion - Specific Gravity Meter Training Class - 2386
CEUs - .7

Overview
This 1-day course consists of a blend of lectures and hands-on exercises that cover an overview of the operating principle, key components and applications of a 3098 Micro Motion Gas Specific Gravity meter. The process of commissioning a 3098 is covered including: installation, wiring, configuration and field calibration at initial startup. Troubleshooting of commonly seen issues is also covered. This course includes hands on demonstrations.

Topics
• Explain the Principle of Operation for how a Micro Motion 3098 Gas Specific Gravity Meter Works and the Function of the Key Components
• Learn the Installation Best Practices for Orienting, Mounting, Piping and Wiring the 3098
• Configure the 3098 and Perform the Required Field Calibration
• Learn a Step by Step Process to Perform Basic Troubleshooting of the Most Common Issues Customers Encounter

Audience
This course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Micro Motion 3098 Gas Specific Gravity meter. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
None required. However, basic understanding of the fundamentals of the behavior/properties of gases and gas density measurement are helpful. Basic electricity, analog & frequency signal processing knowledge are also assumed.
Micro Motion – Coriolis Product Training
(Advanced) – 5713
CEUs: 2.1

Overview
This three-day course is intended for advanced users of Micro Motion Coriolis products who are responsible for the installation and commissioning, maintenance and troubleshooting and advanced operation of the equipment. The format is a mix of lecture and hands-on activities, heavily weighted toward the latter.

Topics
This course covers the following advanced topics:
• Theory of operation advanced topics.
• Advanced troubleshooting concepts, including performing and evaluating data logging.
• Theory of Zero, Zero offset and Zero verification.
• Custody Transfer and the use of Weights and Measures Software.
• Modbus Read/Writes and the use of the Modbus Interface Tool.
• Concentration Measurement.
• 5700 Historian Files, Downloading and Evaluation.
• Ethernet Basics
• Smart Meter Verification

After completing this training, students will also get unlimited access to the Micro Motion’s Online Training (e2353) for a year. This online training cost $400/license per year if purchased separately.

Audience
Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
Students should have completed either Micro Motion 2358, 2380, or 2352 or have six months to a year of field experience in the use and maintenance of Micro Motion Coriolis products. A basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing is assumed.

Micro Motion - Dedicated Density Product Training – 5714
CEUs: 0.7

Overview
This one-day course consists of a blend of lectures and hands-on exercises that cover the installation, configuration, calibration checks and troubleshooting of Micro Motion transmitters and peripherals. Courses held at customer specified sites can be customized to address specific transmitters and configuration tools. Public registration classes cover a broader range of equipment based on the needs of the attendees.

Topics
After attending this course, the student will be able to do the following:
• Explain the principle of operation for how a Micro Motion Density meter works and the function of the key components.
• Apply the installation best practices for orienting, mounting and wiring the sensor and transmitter.
• Configure the metering system to measure flow, density and temperature for their application.
• Apply a step by step process to perform basic troubleshooting of the most common meter and process issues.

Audience
This one-day course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Micro Motion Coriolis flow and density meter. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
None
Mimic - Dynamic Simulation with Mimic
CEUs – 2.1

Overview
In this 3-day course, students explore fundamental features of Mimic Simulation Software. The course focuses on installation and setup, building low and medium fidelity models, complete integration with a control system for configuration or logic checkout, operator training and instructor graphics creation. Completion of this class will enable the student to build a dynamic simulator and successfully integrate it with a control system.

Topics
- Mimic installation and overview
- Communications setup with Simulated IO Drivers
- Discrete and analog modeling
- Development of training scenarios and snapshots using Mimic Operator Training Manager
- Software tools and options to increase efficiency
- System maintenance

Audience
This course is designed for process & process control engineers responsible for configuring and maintaining Mimic simulation software.

Prerequisites
None

Mimic - Advanced Fluid Modeling with Mimic
CEUs – 7602
CEUs – 1.4

Overview
This 2-day course will build on foundations taught in Dynamic Simulation with Mimic while focusing on developing high fidelity models. Mimic’s Advanced Modeling Objects will be used to create end-to-end, unified pressure driven flow networks while incorporating complete mass and energy balances across the entire model. The student will learn to create high fidelity models of processes that contain both liquid and vapor in numerous unit operations. Through lectures, demonstrations, and workshops, students will learn to construct a first principles and unit operations based model.

Topics
- Advanced modeling object configuration
- Model layout and flow network development
- Standard and advanced model aggregation
- Tuning and optimization

Audience
This course is for process and process control engineers responsible for configuring and maintaining high fidelity models of processes that contain both liquid and vapor in numerous unit operations.

Prerequisites
None

Mimic - Advanced Solids Handling with Mimic
CEUs – 7603
CEUs – 1.4

Overview
This 2-day course will build on foundations taught in Dynamic Simulation with Mimic and Advanced Fluid Modeling with Mimic in constructing high fidelity models with liquids, vapors, and solids. Mimic’s Mining Advanced Modeling Objects will be introduced and used to incorporate material balances and particle size tracking across the entire model. The student will learn to create high fidelity models of processes that contain solids and slurries in a variety of different comminution and separation unit operations.

Topics
- Introduction to the advanced mining modeling package
- Configuration and layout of a plant model
- Tuning and optimization of slurry and solid streams
- Supporting standard modeling for improved process responses

Audience
This course is for process and process control engineers responsible for configuring and maintaining a Mimic simulation model with solids handling.

Prerequisites
None

DeltaV - Industrial Ethernet with DeltaV
VIM2 – 7610
CEUs – 2.1

Overview
In this VIM2 Hardware and Software training course, students explore basic setup and configuration of VIM2 hardware and software. The course begins with an introduction to the VIM and firmware options, moving through setup, tuning and configuring the various drivers. Completion of this class will enable the student to better use their VIM2 and successfully integrate it with DeltaV.

Topics
- Introduction to the VIM and firmware options
- VIMNet Explorer and DeltaV Explorer Setup
- VIM Tuning
- Diagnostics
- Configurations of the different drivers
- Integration Best Practices

Audience
This course is for process and process control engineers responsible for configuring the VIM2 card.
Operational Certainty - Advanced Operator Displays - 7625
CEUs – 1.4

Overview
A properly implemented human machine interface (HMI) can reduce operator work load, improve situational awareness, and aid the operator in preventing minor deviations from becoming major incidents. The combination of HMI philosophy and style guides provides a rational and structured basis for ensuring all areas of importance relating to the human machine interface are successfully addressed.

During the two-day course, capture best practice philosophy and standards for use in the design and development of the operator interface for your DCS.

Topics
• HMI Lifecycle
• System Standards Development (New System Entry Point)
• Philosophy
• Style Guide
• HMI Toolkit
• Design (Existing System with New Displays or Display Changes Entry Point)
• User, Task, and Functional Requirements
• Console Design
• HMI System Design
• Display Design
• Implement
• Operate
• Design
• Users - Definitions according to ISA 101.01
• Tasks (Things to Consider)
• Normal Operating Conditions
• Known Abnormal Operating Conditions
• Routine Operating Adjustments
• Functional Requirements
• Console Design
• HMI System Design
• Control System
• Third Party Interfaces
• Display Design
• Goals of HMI Design According to ISA 101.01
• Types of Displays
• Levels of Display
• Level 1 – Functional Overview
• Level 2 – Schematic Overview
• Level 3 – Detailed Process
• Level 4 – Other
• Navigation
• Execution Method for an Advanced HMI Project

Operational Certainty - Advanced Operator Displays – 7625 – Continued...

Audience
This course is ideal for operators and process or controls engineers involved in the Human Machine Interface.

Operational Certainty - AgileOps Alarm Management Software - 7621
CEUs – 2.1

Overview
During the 3-day course, become an expert on eliminating alarm floods for your site and meeting ISA 18.2 KPI performance metrics. Dynamic alarm management can increase productivity, reduce downtime, and improve safety. This course is specifically designed to help you realize these benefits through the optimal dynamic management of your control system with AgileOps software.

This course includes hands-on workstations with access to a live AgileOps system, allowing the student to fully understand the ease of use of AgileOps.

Topics
• Alarm Management and Philosophy
• Master Control System Database
• Branch Management
• Auto Discovery
• Alarm Templates
• Dynamic Management
• Creating Workspaces
• List Management
• Exclusion Lists
• Operator Helper
• EventKPI Reporting
• Configuration
• User Security
• Area Mapping
• KPI Targets
• Troubleshooting

Audience
This course is ideal for managers and engineers in plant operations, process, process controls, and safety and reliability.

Prerequisites
None.

Operational Certainty - Alarm Management - 7620
CEUs – 1.4

Overview
Dynamic Alarm Management and the rationalization of alarms based on process state or mode is rapidly becoming recognized as the key solution path to eliminating alarm floods. Reducing alarm floods is vital to meeting the standards (ISA18.2, ISO/IEC 62682 and EEMUA 191) adopted by governing bodies (OSHA & IEC) and industry (AIChE). In addition, automated alarm shelving management has proven as another best practice for near elimination of long standing alarm lists on the operator’s console.

Our process engineers will share the experiences and best practices learned through rationalizing and implementing Dynamic Alarm Management on hundreds of operator workstations worldwide. The results captured by this work has made significant impact on the safety and operational awareness of every operator and is still paying dividends to the operating companies who have embraced the application of sound process engineering principles.

Topics
Introduction to Alarm Management
The Alarm Management Lifecycle
Alarm Philosophy
Identification, Rationalization and Detailed Design
Management of Change, Implementation, Operation and Maintenance
Monitoring and Assessment and Audit
Dynamic Management and Alarm Shelving Concepts
Project Execution Phases and Example Discussions

Audience
This course is ideal for managers and engineers in plant operations, process, process controls, and safety and reliability.

Prerequisites
None.
Operational Certainty - Advanced Planning Principles - REL005
CEUs - 2.8

Overview
This intensive, 4-day hands-on course is designed to simulate real-world situations and teach participants how to effectively execute the planning function.

Topics
- Work Order Approval
- Job Scoping
- Job Plan Development
  - Developing Procedures and Instruction
  - Performing Time Estimates
  - Material Requirements
  - Identifying Reference Material
  - Developing Post-Maintenance Checks and Completion Testing Requirements
- Utilizing Craft Comments and Incorporating Feedback
- Explain Backlog and Compile Backlog Trend and Reports

Operational Certainty - Introduction to Planning & Scheduling Principles - REL004
CEUs - 1.4

Overview
This introductory 2-day course is designed to provide participants with an understanding of the fundamentals of creating and maintaining an efficient planning and scheduling program.

Topics
- Planning and Scheduling World Class Model
  - Advantages of the Planning Process
  - Characteristics of the Planning and Scheduling World Class Model
  - Characteristics of Planning and Scheduling World Class Model
  - Ratios of Planner, Scheduler and Supervisor to Craftsmen
  - Use and benefit of Predictive Maintenance Technologies
  - Material management impact on Planning and Scheduling
- Planning Principles
  - Planning Fundamentals
  - Basic Job Plan Requirements
  - Requirements of Basic Job Plan Writing
  - Importance of Quantitative Preventative Maintenance Tasks
  - Basic Job Plan Writing and Estimating
  - Work Requests versus Work Orders
- Scheduling Principles
  - Criteria of Scheduling Priorities
  - Criteria for PM Schedule Development
  - Scheduling Fundamentals
  - Relationship Between Resource Availability and Resource Allocation
- Planning and Scheduling Program Monitoring
- Successful Implementation of the Planning and Scheduling Model
- Quality Program Performance Measures
  - Selection and Utilization of an Integrated CMMS System

Operational Certainty - Foundational Awareness for Maintenance and Reliability Professionals - REL009
CEUs – 2.8

Overview
This comprehensive 4-day course is designed to provide participants with an understanding and appreciation of the many foundational elements required for success in the maintenance and reliability field. Both technical and non-technical areas must be understood and integrated in order to be most effective in the maintenance and reliability profession.

Topics
- Business and Management:
  - Strategic Direction and Plan Selling Programs and Change to Stakeholder
  - Create Measurement and Performance Evaluation System
  - Business Case Preparation
  - Communicate to Stakeholders
  - Plan and Budget Resources
  - Maintenance/ Operations Performance Agreement(s)/Specifications
- Manufacturing Process Reliability:
  - Maintain Process and Industry Standards and Specifications
  - Understand the Manufacturing Process
  - Manufacturing Effectiveness Techniques
  - Safety, Health, Environmental Issues
  - Manage Effects of Changes to Processes and Equipment
- Equipment Reliability:
  - Determine Equipment and Process Performance Expectations from the Business Plan
  - Establish Current Performance Levels and Analyze Gaps
  - Establish a Maintenance Strategy to Assure Performance
  - Cost-Justify (Budget) Tactics Selected for Implementation
  - Execute a Maintenance Strategy
  - Review Performance and Adjust Maintenance Strategy
- People Skills:
  - How to Assess Organizational Competence and Direction
  - How to Develop the Maintenance and Reliability Organization Structure and Staff
  - How to Communicate Maintenance and Reliability to the Organization

Operational Certainty – Developing Reliability Based Maintenance Strategy – Introduction – REL003
CEUs - 1.4

Overview
This 2-day course is an introduction to the basic maintenance strategy model that will act as the foundation of developing RCM techniques, choosing and deploying PMs and creating an effective maintenance strategy to support an efficient maintenance environment.

Topics
- Maintenance Strategy Models
- Basic RCM Techniques
- PM Task Selection
- Basic PM Tools
- PM Program Design
- PM Development Principles
- PM Scheduling Techniques
- PM Program Monitoring
### Operational Certainty - The Reliability Game - REL001

**Overview**
The Reliability Game focuses on participants' attention on the maintenance function at a facility. This 1-day game is a simulation that clearly demonstrates the value of proactive reliability practices and the positive effects it has on the bottom line. The simulation is both fun and educational. The simulation also provides a mechanism to help the participants create a common understanding of basic reliability business goals.

**Topics**
- The Financial Opportunity Associated with Proactive Maintenance
- Where the Money Goes
- How to Stop Wasting Money
- The Value of Proactive Maintenance to Their Maintenance Processes
- The Power of Teamwork
- The Logic Behind Emerson Benchmark Data
- Concept of the Failure Interval on the Potential Failure Curve (P-F Interval) and its Relationship to the Planning Process
- Proactive Maintenance Model

### Operational Certainty - Maintenance 101 / 201 - REL008

**Overview**
It is well documented that managing the maintenance function in a proactive rather than a reactive manner results in lower costs and superior asset performance. This is easy to say but difficult to do in actual practice. This 1-day course will explore twenty of the most basic fundamentals that every Maintenance Manager must have in place in order to make a proactive maintenance organization a reality.

**Topics**
- Introduction
- Elements of a Proactive Maintenance Philosophy
- Equipment Failures Are Unacceptable
- Important Work vs. Urgent Work
- The Maintenance-Operations Partnership
- The Importance of Good Data
- Entropy as It Applies to Maintenance
- Precision Maintenance - The Last Frontier
- The System Wins Every Time
- Effective Methods for Reducing Maintenance Costs
- Processes that Must Be in Place
- Build a Solid Foundation First
- The Work Management System
- Planning
- Scheduling
- Storeroom Inventory Management
- The Importance of Predictive Maintenance
- Organizational Structure Considerations
- Why Reliability Engineers Are Critical
- The Importance of Field Supervision
- The Importance of Procedures

### Operational Certainty - Materials Management Strategies - REL006

**Overview**
This introductory 2-day course is designed to provide participants instruction about how to manage, organize, and control inventory risk through strategic MRO inventory management.

**Topics**
- Introduction
- Maintenance Storeroom Purpose
- Maintenance Storeroom Functions and Expectations
- Meeting Expectations
- Purpose and Strategic Importance
- Role of Stores
- Best Practices to Achieve Effective Stores Management and Implement Reliability
- Organizing for Maintenance Stores and Management Control
- Inventory Management Key Elements
- Inventory Record Accuracy (IRA)
- Storeroom Access and Control
- Inventory Catalog
- Stores Management Tools
- Stores/Inventory Cost
- Obsolete Parts and Location
- Stores Control Methods
- The Replenishment Process
- Inventory Record Accuracy (IRA) Benefits
- High Performance Stores
- Storeroom Best Practice Guidelines
- Quality Control
- Stores KPI Metrics and World Class Benchmarks
Operational Certainty - Predictive Maintenance Technology Awareness - REL011
CEUs – 1.6

Overview
Predictive Maintenance Technology Awareness

This seminar increases personnel awareness of the need for a “precision” approach through use of extensive case histories and success stories. It explores the effective implementation of Machinery Reliability Programs; provides an overview of the current PdM technologies and their appropriate applications; and provides information on proven methods for justifying the investment in PdM tools, time, and training.

Topics/COURSE OUTLINE:
- Unit 1 Introduction
- Unit 2 Machinery Reliability Overview
- Unit 3 Introduction to Vibration Detection and Analysis
- Unit 4 Introduction to Ultrasonics
- Unit 5 Introduction to Infrared Thermography
- Unit 6 Introduction to Oil Analysis
- Unit 7 Application of Condition Monitoring Technologies to Common Problems
- Unit 8 Work Performance, Job Plan Improvement and Equipment Reliability Improvement Processes

Audience
Management, Reliability Staff, Maintenance Staff

Prerequisites
None

Operational Certainty- Reliability Awareness Featuring - The Reliability Game - REL002

Overview
This 2-day combination of The Reliability Game and expanded topics around the development of a Reliability Based Maintenance Program. The Reliability Game focuses participants’ attention on the maintenance function at a facility. The game is a simulation that clearly demonstrates the value of proactive reliability practices and the positive effects it has on the bottom line. The simulation is both fun and educational. The simulation also provides a mechanism to help the participants create common understanding of basic reliability business goals.

The Reliability Overview discusses the essential elements learned through playing the Reliability Game and reinforces how a strong reliability program helps corporations achieve success.

Topics
- The Financial Opportunity Associated with Proactive Maintenance
- Where the Money Goes
- How to Stop Wasting Money
- The Value of Proactive Maintenance to Their Maintenance Processes
- The Power of Teamwork
- The Logic Behind Emerson Benchmark Data
- Concept of the Failure Interval on the Potential Failure Curve (P-F Interval) and its Relationship to the Planning Process
- Proactive Maintenance Model
- Financial Benefit of Advanced Planning of Maintenance Work
- Typical Preventative Maintenance (PM) Programs seen in Industry Today
- Criticality Ranking Process
- Nature of Failures
- Process for Conducting a Reliability Centered Maintenance (RCM) and a Failure Modes and Effects Analysis (FMEA)
- Importance of PM and Predictive Maintenance
- (PDM) Development, Including the concept of Quantitative PMs
- The Key Concepts of Change Management

Audience
Management, Reliability Staff, Maintenance Staff

Prerequisites
None

Operational Certainty - Reliability Centered Maintenance Principles - REL007
CEUs – 1.4

Overview
Reliability Centered Maintenance Analysis (RCM) is a key foundational element of a Reliability Based Maintenance program.

This 2-day course covers all important aspects of Reliability Centered Maintenance Analysis and Implementation. Participants will learn how to effectively participate in an RCM program and have all necessary information to support such an implementation.

Topics
- Introduction
- History of RCM
- Why RCM
- Selecting Candidate Equipment
- Team Approach
- RCM Philosophies
- Conducting RCM Analysis
- RCM Terms and Definitions
- Identifying System Parameters
- Answering the 7 Questions of RCM
- Determining Failure Mitigation Strategies
- Implementing the Results of RCM Analysis
- Facilitating RCM at Your Site
- Who should Lead
- Choosing the Appropriate Analysis Tools
- Tracking Progress through to Completion
- Avoiding the Causes of Failed Implementations
- Leveraging the Benefits of RCM
- Lateral Deployments
- The FMEA Library
- Celebrating Results
- Showing the Business Case
Ovation™ - AMS Suite: Intelligent Device Manager - OV275

**Overview**
The OV275 - Virtual course is designed to enable the end-user to configure and use the Emerson's AMS Suite: Intelligent Device Manager with the Ovation™ control system. Students will receive hands-on experience using the Ovation and AMS Device Manager to configure Smart Devices on the Ovation network. Students will also configure and examine Ovation PlantWeb Alerts generated from the Smart Devices. This course will provide instruction on how to configure and troubleshoot the Ovation system and AMS Device Manager.

**Topics**
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Understand the basic topology of an Ovation™ network that includes an AMS Intelligent Device Manager Station
- Recognize AMS Suite software applications
- Understand AMS Intelligent Device Manager licensing
- Complete normal AMS Intelligent Device Manager administrative functions
- Use basic AMS Intelligent Device Manager functions
- Understand AMS Intelligent Device Manager SNAP-ON capabilities
- Update AMS Intelligent Device Manager DD files

**Prerequisites**
Ovation – Data Acquisition – OV100 and Ovation – HART and Smart Devices – OV270

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Ovation™ - AMS Suite: Intelligent Device Manager – Virtual - OV275V

**Overview**
The OV275 - Virtual course is designed to enable the end-user to configure and use the Emerson's AMS Suite: Intelligent Device Manager with the Ovation™ control system. Students will receive hands-on experience using the Ovation and AMS Device Manager to configure Smart Devices on the Ovation network. Students will also configure and examine Ovation PlantWeb Alerts generated from the Smart Devices. This course will provide instruction on how to configure and troubleshoot the Ovation system and AMS Device Manager.

**Topics**
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Understand the basic topology of an Ovation™ network that includes an AMS Intelligent Device Manager Station
- Recognize AMS Suite software applications
- Understand AMS Intelligent Device Manager licensing
- Complete normal AMS Intelligent Device Manager administrative functions
- Use basic AMS Intelligent Device Manager functions
- Understand AMS Intelligent Device Manager SNAP-ON capabilities
- Update AMS Intelligent Device Manager DD files

**Prerequisites**
Ovation – Data Acquisition – OV100 and Ovation – HART and Smart Devices – OV270

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Ovation™ - Applications with DeviceNet - OV345

**Overview**
The OV345 is designed to provide the end-user with a thorough knowledge of DeviceNet applications as applied to an Ovation™ system. Taught subjects include: Ovation DeviceNet Module, segment design, device commissioning, point mapping and basic troubleshooting. Students will be provided with hands-on experience implementing DeviceNet architecture.

**Topics**
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Define Ovation™ DeviceNet architecture
- Understand DeviceNet operation and communication
- Implement an Ovation specific DeviceNet scheme and topology
- Build Ovation points for use in DeviceNet architecture
- Implement control loops in fieldbus and feedback to Ovation
- Configure Ovation graphics to function with a fieldbus system
- Analyze the timing of the system when fully operational

**Prerequisites**
OV100 - Starting with Data Acquisition and OV200 - Building and Maintaining Ovation™ Control. OV275 - AMS Suite: Intelligent Device Manager - is recommended but not required.
Ovation™ - Applications with Profibus - OV350

Overview
The OV350 course is designed to provide the end-user with a thorough knowledge of Profibus applications as applied to the Ovation™ system. Topics for discussion include: Ovation Profibus Module, segment design, device commissioning, point mapping and basic troubleshooting. Students will gain hands-on experience implementing Profibus architecture.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Define Ovation™ Profibus architecture
- Understand Profibus operation and communications
- Identify the required hardware and software needed for an Ovation™ Profibus interface
- Update the Ovation/Sycon Device list
- Demonstrate the Sycon engineering tool to configure Profibus devices
- Build Ovation points for use in Profibus architecture
- Implement an Ovation specific Profibus scheme and topology

Prerequisites
Ovation – Data Acquisition -OV100

Ovation™ - AV Management - OV367

Overview
The OV367 course is designed for the end-user charged with maintaining the anti-virus solutions for the Ovation™ System. Course will focus on installing endpoint software, obtaining and distributing virus definitions, upgrading anti-virus versions and configuring the AV servers.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Configure the anti-virus server
- Run reports
- Update virus definitions
- Install anti-virus software on endpoints

Prerequisites
Ovation – Data Acquisition –OV100, Ovation – Building and Maintaining Ovation Control –OV200, Ovation - Building Ovation Graphics – OV210 and Ovation Troubleshooting - OV300

Ovation™ - Base Certification - OV400

Overview
The OV400 course is offered to the end-user as a stand-alone or web-based exam or implemented with a pre-testing review at the Training Center. The student’s proficiency is measured in areas related to database building, control implementation, control graphic linkage and troubleshooting on a system-wide basis. For both offerings, a multi-point examination is administered, and participants are required to achieve a grade score >80% to successful gain certification.

Topics
Upon completion of this course and achieving a successful level of competency in the online examination, the student will receive an Ovation™ certification award. This achievement affirms and recognizes that the student is fully cognizant and possesses the necessary skills to successfully engineer and maintain an Ovation control system for their organization. The student has demonstrated proficiency in the following areas:
- Building saving and implementing the Oracle database
- Constructing control sheets using both Boolean and Analog logic
- Loading and configuring the Ovation™ Controller
- Designing graphics with control implementation
- Troubleshooting procedures as related to I/O and Controller modules

Prerequisites
Ovation – Data Acquisition – OV100, Ovation – Building and Maintaining Ovation Control – OV200, Ovation - Building Ovation Graphics – OV210 and Ovation Troubleshooting - OV300
Ovation™ - Base Certification – Virtual - OV400V

Overview
The OV400 course is offered to the end-user as a stand-alone or web-based exam or implemented with a pre-testing review at the Training Center. The student’s proficiency is measured in areas related to database building, control implementation, control graphic linkage and troubleshooting on a system-wide basis. For both offerings, a multi-point examination is administered, and participants are required to achieve a grade score >80% to successful gain certification.

Topics
Upon completion of the course and achieving a successful level of competency in the online examination, the student will receive an Ovation™ certification award. This achievement affirms and recognizes the student is fully cognizant and possesses the necessary skills to successfully engineer and maintain their Ovation control system for their organization. The student has demonstrated proficiency in the following areas:

- Building saving and implementing the Oracle database
- Constructing control sheets using both Boolean and Analog logic
- Loading and configuring the Ovation™ Controller
- Designing graphics with control implementation
- Troubleshooting procedures as related to I/O and Controller modules

Prerequisites
Ovation – Data Acquisition – OV100, Ovation – Building and Maintaining Ovation Control – OV200, Ovation – Building Ovation Graphics – OV210 and Ovation Troubleshooting - OV300

Ovation™ - Best Practices - OV301

Overview
The OV301 course is designed to provide the end-user with the knowledge and methods to maintain a reliable Ovation™ DCS working system with regard to:

- Ovation database, OPH configuration techniques, network monitoring, control task monitoring, best graphics practices, I/O reliability, patching, backups, Anti-Virus and engineering gathered utilities.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Perform backups on the Ovation™ system
- Install anti-virus programs on the Ovation system
- Monitor the overall reliability of the Ovation system
- Install software patches on the Ovation System

Prerequisites
Ovation - Data Acquisition - OV100, Ovation – Building and Maintaining Ovation Control – OV200 and Ovation – Building Ovation Graphics – OV210

Ovation™ - Boiler Control - OV380

Overview
The OV380 course is an introduction to boiler control for those who interface with control programs or may make modifications to their existing control programs. Using previous control-building knowledge, the student will learn how to implement and design pertinent boiler control logic in an Ovation™ environment. Instruction will emphasize the proper selection, configuration and application of algorithms in a typical Ovation boiler control system. The writing of control logic is included as course work.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Review the history of boilers
- Review the development of boiler safety and the development of standards
- Discuss the typical control logic used in the water, steam, air and fuel systems
- Discuss and review SAMA and ISA control symbols
- Discuss and review measuring elements and final control elements used in boiler control
- Discuss and review compensations, conversions and voting in measuring elements
- Discuss and review three element drum control, cross limiting control, de-superheat control, furnace pressure control, fuel calculations and O2 correction
- Discuss and review stoichiometric relationships in boiler control
- Discuss the typical types of control utilized in boilers: ratio, feed forward, cascade, single element, two element, and three element
- Discuss and review the different components of a boiler: reheat, wall burners, tangentially fired burners, ID and FD fans, mills and feed pumps

Prerequisites
Ovation - Data Acquisition - OV100, Ovation – Building and Maintaining Ovation Control – OV200
Ovation™ - Building and Maintaining Ovation Control - OV200

Overview
The OV200 course is designed to provide proficiency in reading Ovation™ functional control schemes. Tuning, building and implementing new control schemes to improve performance are covered. Both modulating (analog) and discrete digital control schemes are included in the scope of the course. Discussions include the various types of control algorithms available and how they can be used to create effective control. The course is further intended for people who work with Ovation Controllers to tune and build analog and digital control schemes in a Windows environment.

Topics
Upon successful completion of this course and using the reference materials provided, the student will be able to:

- Interpret and apply a control functional to the Ovation™ Windows-based system.
- Interpret and tune implemented control using the available tools.
- Edit existing control schemes
- Demonstrate proficiency in building digital and analog control.
- Design and implement a tracking scheme to meet specific control requirements.
- Recognize the relationship between control schemes and graphic diagrams.
- Implement given control requirements using the Control Builder.
- Evaluate and determine the proper operation of a control scheme using the tools and methods provided.

Prerequisites
Students must have a good understanding of the Ovation™ system architecture and how database point records are built and maintained in the Ovation Windows-based system. Student should attend the OV100 prior to attending this course.

Ovation™ - Building Ovation Graphics – OV210

Overview
The OV210 course was designed to teach the end-user how to construct graphic diagrams that depict the controlled process. Students will use the Ovation™ Graphics Builder program to build process diagrams, implement the display of static and dynamic objects, and provide for control linkage and conditional changes that occur due to alarm conditions or process changes. Methods for standardizing information entities, control interfaces and troubleshooting problems within the graphics code are also covered.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Describe the different building areas within the graphic source code
- Build graphics to display static and dynamic plant data
- Employ various drawing techniques to create 3D graphics
- Directly link graphics to actual control using poke fields
- Design and implement MACROS used within graphics
- Implement conditional statements to create dynamic indications within the graphic
- Employ various techniques that enable the graphic code to execute more efficiently
- Use various application programs within a graphic to perform a specific function
- Assess and correct problems in graphics using available tools

Prerequisites
OV100 and OV200 are strongly recommended

Ovation™ - Building Ovation Graphics – Virtual - OV210V

Overview
The OV210 course was designed to teach the end-user how to construct graphic diagrams that depict the controlled process. Students will use the Ovation™ Graphics Builder program to build process diagrams, implement the display of static and dynamic objects, and provide for control linkage and conditional changes that occur due to alarm conditions or process changes. Methods for standardizing information entities, control interfaces and troubleshooting problems within the graphics code are also covered.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Describe the different building areas within the graphic source code
- Build graphics to display static and dynamic plant data
- Employ various drawing techniques to create 3D graphics
- Directly link graphics to actual control using poke fields
- Design and implement MACROS used within graphics
- Implement conditional statements to create dynamic indications within the graphic
- Employ various techniques that enable the graphic code to execute more efficiently
- Use various application programs within a graphic to perform a specific function
- Assess and correct problems in graphics using available tools

Prerequisites
OV100 and OV200 are strongly recommended
Ovation™ - Control Techniques - Advanced - OV330

Overview
The OV330 - Virtual offered course is designed for end-users who will implement their own control programs or who will make significant modifications to existing programs. Using previous control-building knowledge, the student will learn how to implement control design in an Ovation™ environment. The course will emphasize the proper selection, configuration and application of algorithms in the Ovation control system.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Apply, tune and track all appropriate algorithms in open-and-closed loop configurations
- Select, filter and compensate transmitter inputs
- Implement complex sequential control
- Appreciate important closed-loop control forms
- Configure general math computations
- Describe the interface of selected algorithms to I/O hardware
- Use algorithms for timing, counting, accumulation and system-time applications
- Use algorithms for timing, counting, accumulation and system-time applications

Prerequisites
Ovation - Building and Maintaining Ovation Control – OV200

Ovation™ - Control Techniques - Advanced – Virtual - OV330V

Overview
The OV330V - Virtual offered course is designed for end-users who will implement their own control programs or who will make significant modifications to existing programs. Using previous control-building knowledge, the student will learn how to implement control design in an Ovation™ environment. The course will emphasize the proper selection, configuration and application of algorithms in the Ovation control system.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Apply, tune and track all appropriate algorithms in open-and-closed loop configurations
- Select, filter and compensate transmitter inputs
- Implement complex sequential control
- Appreciate important closed-loop control forms
- Configure general math computations
- Describe the interface of selected algorithms to I/O hardware
- Use algorithms for timing, counting, accumulation and system-time applications
- Use algorithms for timing, counting, accumulation and system-time applications

Prerequisites
Ovation - Building and Maintaining Ovation Control – OV200

Ovation™ - Data Acquisition - OV100

Overview
For those new to the Ovation™ system, the Ovation Data Acquisition course covers Ovation terminology, Operator functions and the Ovation Controller physical layout. The course offers practice using the Ovation engineering tools that are designed to simplify data acquisition. Data acquisition types include digital, analog and analog temperature sensing sources, as well as introducing the end-user to the Developer Studio for point building and I/O module configuration.

Topics
- Identify the major components in an Ovation™ system
- Understand basic Ovation terminologies
- Identify the major devices and subsets in an Ovation Controller Cabinet
- Demonstrate basic Ovation operator functions
- Understand data movement in an Ovation system
- Utilize the Ovation Developer Studio to create and modify digital and analog process points
- Configure I/O modules for temperature data acquisition
- Address, hardware and test I/O modules

Ovation™ - Digital Generator Control - OV376

Overview
The OV376 is designed for the end-user who will implement the DGC and its elemental components, maintenance and troubleshooting, data retrieval and analysis.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Navigate the control software and review alarm
- Understand basic DGC troubleshooting and maintenance procedures
- View the DGC Application Software Display, Log-view and Sequence of Events
- Understand basics of Amplifiers, Firing Circuits and the Controller
- Review the fundamentals and technology associated with the DGC
Upon successful completion of this course, students will be using or managing the EDS. This course is designed for anyone who will be using or managing the EDS.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Illustrate the functions of the EDS system and architecture
- Explain how an EDS server is loaded and configured
- Configure and EDS client to communicate with an existing EDS
- Manage the data storage of the EDS
- Demonstrate how to view and interpret error messages
- Build reports using the EDS Report Builder

Ovation™ - EDS™ (Enterprise Data Server) – Virtual - OV248V

Overview
This (virtual) course is designed to give students a detailed understanding of the EDS™. Upon completion of this course, the student will be able to configure an EDS server to collect point data from an existing Ovation™ system. An EDS client will be properly configured and the applications of the EDS station will be covered extensively. This course is designed for anyone who will be using or managing the EDS.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Illustrate the functions of the EDS system and architecture
- Explain how an EDS server is loaded and configured
- Configure and EDS client to communicate with an existing EDS
- Manage the data storage of the EDS
- Demonstrate how to view and interpret error messages
- Build reports using the EDS Report Builder

Ovation™ - EDS™ (Enterprise Data Server) Administration - Virtual - OV249V

Overview
This course is designed to give students a more in-depth understanding of the EDS server and feeders. Upon completion of the course, students will be able to configure an EDS server to collect point data from an existing Ovation system. An EDS client will be properly configured as well as an EDS feeder. The course is designed for anyone managing the EDS server & feeders. Report building from terminal and the Excel plug-in will also be incorporated into the 5-day training.

Topics
1. DESCRIBE the functions of the EDS and related components
2. RECOGNIZE the hardware used in an EDS
3. UNDERSTAND EDS server configuration and setup
4. LOAD and CONFIGURE Data Interfaces to Ovation
5. LOAD and CONFIGURE an EDS server
6. LOAD and CONFIGURE Database Access Software components
7. NAVIGATE and UNDERSTAND the Database Access application
8. LOAD and CONFIGURE EDS Terminal Software components
9. TROUBLESHOOT common EDS issues
10. MAINTAIN the EDS
11. DEFINE reports using the Report Editor application
12. BUILDING reports in Excel
13. MONITOR reports using the Report Monitor application
14. RECOGNIZE the function of the Messages application

Ovation™ - Ethernet Link Controller with Third Party I/O - OV296

Overview
The OV296 course was designed to enable the end-user to configure, network and troubleshoot Ethernet Link Controllers and third-party I/O points. Topics covered include: configuration of the ELC in Developer Studio, using the ELC Configuration Tool, simplex and redundant ELC’s, networking, communication protocols, editing XML files, graphics, troubleshooting and building third-party I/O points. Students will configure the ELC to communicate with RTU’s via both the Ethernet and Serial links.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Describe the functions and differences of the Ovation™ Windows network and its components.
- Monitor plant processes using Ovation Windows data acquisition tools.
- Navigate and understand the Ovation Developer Studio.
- Demonstrate a basic level of proficiency using the Ovation Control Builder.
- Demonstrate a basic level of proficiency using the Ovation Graphics Builder.
- Understand and implement some basic Ovation Windows configuration changes.

Ovation™ - Evergreen Upgrade - OV115

Overview
This course is designed to teach the Ovation™ Windows software utility packages from a higher level. The course provides instruction on the Ovation Windows studio of application programs including the building of point records, control sheets, graphic displays and the loading, saving and downloading of each entity. Topics for discussion include: basic networking, Ovation architecture and components, Operator functions, Developer Studio features, control and graphics building and basic system configuration.

Topics
Upon successful completion of this course and using the reference material provided, the student will be able to:

- Describe the functions and differences of the Ovation™ Windows network and its components.
- Monitor plant processes using Ovation Windows data acquisition tools.
- Navigate and understand the Ovation Developer Studio.
- Demonstrate a basic level of proficiency using the Ovation Control Builder.
- Demonstrate a basic level of proficiency using the Ovation Graphics Builder.
- Understand and implement some basic Ovation Windows configuration changes.
Ovation™ - Expert Transition - OV265

Overview
The OV265 course was designed to provide the end-user with proficiency in updating the Ovation™ interface after a change has been made to the Bailey I/O. Students will learn the basic mechanics of using the Ovation OPC client and OPC90 Server (ROVISYS) applications. Course elements include layout and implementation of the hardware and software required for the migration. Simple methods for troubleshooting faults will also be discussed.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Understand the different methods of a Bailey to Ovation™ migration
- Recognize hardware components used for the Bailey to Ovation migration
- Recognize software components used for the Bailey to Ovation migration
- Understand Bailey block to Ovation point mapping
- Use the Bailey to Ovation migration tool
- Update the Ovation interface when changes are made to the Bailey I/O
- Troubleshoot the Ovation interface using ROVISYS and OPC Client Mapper

Prerequisites
Ovation - Data Acquisition – OV100

Ovation™ - Graphics - Advanced - OV310

Overview
The OV310 course is designed to provide the end-user with enhanced graphic programming skills. Topics for discussion include: Macros, Pointers, special application programs, trigger statements, sub-routines and correct coding for increased graphic execution speed.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Define the different memory segments available in the graphic subsystem
- Build graphics utilizing pointer commands with segmented memory
- Interpret and use the library of application programs
- Use the trigger section of the graphics code for efficiency
- Use graphic commands only available in a text editor
- Troubleshoot graphics code using available tools

Prerequisites
Ovation - Data Acquisition – OV100
Ovation – Building & Maintaining Ovation Control – OV200
Ovation – Building Ovation Graphics – OV210

Ovation™ - Graphics - Advanced - Virtual - OV310V

Overview
Uses application programs and advanced programming techniques, including the use of memory segments combined with pointer manipulation, to enhance advanced graphic programming skills. Builds several graphics utilizing pointers and memory segments. Teaches students to assess problematic graphics and solve them with available tools.

Topics
1. Define the different memory segments available in the graphics subsystem
2. Build several graphics utilizing pointers and memory segments
3. Interpret application programs
4. Use the trigger section of the graphics code for efficiency
5. Use graphic commands only available in a text editor
6. Troubleshoot graphics with available tools
7. Define and implement different types of Variables
8. Build Graphics Utilizing Variables

Prerequisites
OV100, OV200, OV210

Ovation™ - Hardware Project - OV216

Overview
The OV216 course is designed for the end-user whose primarily interest and/or assignment is maintaining Ovation™ hardware. Selected topics from several courses are incorporated and expanded upon. Topics included are the replacement and set-up of an Ovation Controller and Flash Disk. Several different power supply configurations are discussed. Attendees will install new I/O Thermocouple/RTD modules and build several temperature-derived points. Students will install a HART® (4-20) ma analog input module and transmitter. Each student will install and configure an Ovation Remote Node Controller with fiber connections.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Utilize documentation to analyze faults or problem conditions in the Ovation™ System
- Interpret Ovation system error messages
- Demonstrate remote I/O technology
- Understand recovery or hard-drive failures on MMI’s
- Configure CISCO switches and routers
- Monitor status LED’s of the Ovation system
- Build various RM records
- Implement closed loop control strategies
- Evaluate and determine operation of power supplies

Prerequisites
Ovation - Data Acquisition – OV100
Ovation – Building and Maintaining Ovation Control – OV200 and Ovation – Software Project – OV215
Ovation™ - HART® and Smart Devices - OV270

Overview
The OV270 - Virtual offered course was designed to provide the end-user with the skills to fully utilize the special features of I/O related to HART® and Smart Field Devices attached to the Ovation™ system. Students will learn the basic components of an Ovation system. Items discussed will include physical attachment of field devices to the Ovation I/O modules, and diagnosis of problems that may occur.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Identify the configuration of components in an Ovation™ system using HART®/Smart Devices
- Attach HART®/Smart Field Devices to the Ovation™ I/O cards
- Build database point for the Field Devices
- Use AMS Suite to obtain data from the Field Devices
- Diagnose common problems and configuration errors

Prerequisites
Ovation - Data Acquisition – OV100

Ovation™ - HART® and Smart Devices – Virtual - OV270V

Overview
The OV270V - Virtual offered course was designed to provide the end-user with the skills to fully utilize the special features of I/O related to HART® and Smart Field Devices attached to the Ovation™ system. Students will learn the basic components of an Ovation system. Items discussed will include physical attachment of field devices to the Ovation I/O modules, and diagnosis of problems that may occur.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Identify the configuration of components in an Ovation™ system using HART®/Smart Devices
- Attach HART®/Smart Field Devices to the Ovation™ I/O cards
- Build database point for the Field Devices
- Use AMS Suite to obtain data from the Field Devices
- Diagnose common problems and configuration errors

Prerequisites
Ovation - Data Acquisition – OV100

Ovation - Machinery Health Monitor Vibration - OV277

Overview
This course will cover general concepts regarding the Ovation Machinery Health Monitor I/O module for measuring and recording plant vibration data. The student will configure the I/O module, install multiple types of vibration inputs and monitor the feedback data utilizing Emerson vibration sensors. Configuration of the Machine Works Application will also be discussed.

Please note: At the current time this course does not cover the utilization of Bentley Nevada or other Manufacturers vibration sensors into the MHM Module.

Topics
1. Introduction to MHM and types of Vibration Sensors
2. Inserting the MHM module into Ovation
3. Verification of MHM module Firmware and updating firmware
4. Build Vibration points
5. Setting Up Ovation Machine Works Application

Ovation™ - Network Administration - OV320

Overview
The OV320 course is designed to provide the end-user with a general understanding of networking concepts as well as Ovation™-specific network configurations for Fast Ethernet systems. Students will learn the basic networking skills required for general network administration and troubleshooting. Students will also be provided with hands-on knowledge of switch and route configurations for use in Ovation systems. This course will serve as one of the pre-requisites toward completing the Ovation Certification program.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Explore basic networking concepts including the OSI reference model, MAC addressing, TCP/IP, IP addressing, multicast addressing and local area networks
- Implement an Ovation™-specific network addressing scheme and network topology
- Define and explore basic network commands
- Define network devices and media and their relation to the OSI reference model
- Configure CISCO 2600 series routers, CISCO 3550 series switches and CISCO 2950 series switches for use in an Ovation network

Prerequisites
Ovation - Data Acquisition – OV100
### Ovation™ - OPH Report Building – Virtual - OV246V

**Overview**
The OV246 - Virtual offered course was designed to teach the end-user how to configure and retrieve historical data using the Ovation™ Process historian (OPH) and Crystal Reports. Students will use the OPH Report Manager to define (Alarm, SOE, and Operator Event) reports. Using the same manager, students will learn how to configure (On-Demand, Triggered and Timed) reports. Students will also use Crystal Reports to create new report formats for use in the OPH Report Manager.

**Topics**
Upon successful completion of this course, the student will be able to:
- Describe the functions of the Ovation™ Process Historian and its related components
- Recognize the Ovation Process Historian Database Schema
- Understand the concept of a Relational Database Management System
- Schedule, automate and manipulate reports
- Distribute reports using printers and various output files
- Create custom reports using 3rd party applications such as Crystal Reports and MS Excel

**Prerequisites**
Ovation - Data Acquisition – OV100

### Ovation – Operator – OV010

**Overview**
This course is designed to provide students with the ability to efficiently perform routine plant operations using the Ovation control system. Key topics include data acquisition, process analysis and control interfaces. Students will be able to use the tools provided to monitor processes controlled by the Ovation system and will learn to take appropriate actions to control these processes. This course is intended for all Operations personnel using the Ovation system.

**Topics**
Upon successful completion of the course and using the reference material provided, the student will be able to:
1. List the major components of the Ovation control system.
2. Display process diagram graphics.
3. Use process diagrams to interface with the control system
4. Evaluate point alarm conditions and acknowledge emergent alarms.
5. Differentiate various point types and use the Point Information system to find and edit point records.
6. Create live and historical trends.
7. Navigate through control tuning diagrams.
8. Analyze system problem conditions.
9. Use system reporting procedures.
10. Describe the function of Ovation application icons.
11. Demonstrate familiarity with menu bars and tool bars in various process diagram windows.
12. Demonstrate familiarity with the task bar and other Windows utilities.

### Ovation – Operator – Virtual - OV010V – Continued...

4. Evaluate point alarm conditions and acknowledge emergent alarms.
5. Differentiate various point types and use the Point Information system to find and edit point records.
6. Create live and historical trends.
7. Navigate through control tuning diagrams.
8. Analyze system problem conditions.
9. Use system reporting procedures.
10. Describe the function of Ovation application icons.
11. Demonstrate familiarity with menu bars and tool bars in various process diagram windows.
12. Demonstrate familiarity with the task bar and other Windows utilities.

### Ovation – Ovation Excitation System - OV377

**Overview**
This course is for Ovation excitation. The course is intended for engineers and I&C Technicians that interface and maintain an Ovation excitation system and includes a review of the history and fundamentals of excitation, types of excitation, and the concepts of SCR bridges. The course discusses excitation and its elemental components, maintenance and troubleshooting, data retrieval and analysis. No required prerequisites as this course does not require knowledge of Ovation DCS. Course content is primarily by lecture with minimal hands-on equipment.

**Topics**
1. Review fundamentals of excitation
2. Use Ovation applications to maintenance and troubleshooting

### Ovation – Operator – Virtual - OV010V

**Overview**
This course is designed to provide students with the ability to efficiently perform routine plant operations using the Ovation control system. Key topics include data acquisition, process analysis and control interfaces. Students will be able to use the tools provided to monitor processes controlled by the Ovation system and will learn to take appropriate actions to control these processes. This course is intended for all Operations personnel using the Ovation system.

**Topics**
Upon successful completion of the course and using the reference material provided, the student will be able to:
- List the major components of the Ovation control system.
- Display process diagram graphics.
- Use process diagrams to interface with the control system
- Evaluate point alarm conditions and acknowledge emergent alarms.
- Differentiate various point types and use the Point Information system to find and edit point records.
- Create live and historical trends.
- Navigate through control tuning diagrams.
- Analyze system problem conditions.
- Use system reporting procedures.
- Describe the function of Ovation application icons.
- Demonstrate familiarity with menu bars and tool bars in various process diagram windows.
- Demonstrate familiarity with the task bar and other Windows utilities.
Overview
The OV245 course was designed to teach the end-user how to configure the Ovation™ Process Historian to retrieve real-time and historical data. The Ovation Process Historian hardware and database schema is reviewed in detail and various methods or data retrieval will be discussed including Report Manager, Crystal Reports, Historical Reviews and Trends.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

• Describe the functions of the Ovation™ Process Historian and related components
• Configure scanners and points for collection
• Recognize the Ovation Process Historian database scheme
• Understand the concept of a Relational Database Management System
• Install and configure the Ovation Process Historian Report Manager
• Schedule, automate and manipulate reports
• Create custom reports using third-party applications such as Crystal Reports, MS Excel, MS Access and SQL
• Create historical trends and build global trend groups
• Create historical Point, Alarm, Operator-Event, ASCII and common reviews
• Analyze the Ovation Process Historian with the diagnostic tools available

Prerequisites
Ovation - Data Acquisition – OV100

Ovation™ - SCADA System - OV280

Overview
The OV280 - Virtual offered course was designed to provide the end-user with knowledge on the Ovation™ SCADA system. Student will learn the basic components of an Ovation SCADA system with discussions centered on SCADA servers, (RTU’s) Remote Terminal Units, scan blocks, lines, ports, configuration tool, protocol analyzers and etc. Students will engage and establish communication using a variety of Allen-Bradley, MODBUS or DNP 3.0 protocols.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

• Identify the purpose and components in an Ovation™ SCADA system
• Identify the licensing requirements of an Ovation SCADA system
• Use the configuration tool to access and modify the system
• Analyze the communication protocols used with and Ovation SCADA system
• Utilize the protocol analyzer to interpret signal traffic between the SCADA Server and the RTU’s
• Interpret scan block data
• Create Ovation graphics to interface to the Ovation SCADA system

Prerequisites
Ovation - Data Acquisition – OV100 and Ovation – Building Ovation Graphics – OV210
Ovation™ - SCADA System – Virtual - OV280V

Overview
The OV280 - Virtual offered course was designed to provide the end-user with knowledge on the Ovation™ SCADA system. Student will learn the basic components of an Ovation SCADA system with discussions centered on SCADA servers, (RTU's) Remote Terminal Units, scan blocks, lines, ports, configuration tool, protocol analyzers and etc. Students will engage and establish communication using a variety of Allen-Bradley, MODBUS or DNP 3.0 protocols.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Identify the purpose and components in an Ovation™ SCADA system
- Identify the licensing requirements of an Ovation SCADA system
- Use the configuration tool to access and modify the system
- Analyze the communication protocols used with and Ovation SCADA system
- Utilize the protocol analyzer to interpret signal traffic between the SCADA Server and the RTU's
- Interpret scan block data
- Create Ovation graphics to interface to the Ovation SCADA system

Prerequisites
Ovation - Data Acquisition – OV100 and Ovation – Building Ovation Graphics – OV210

Ovation™ - Security Administration - OV360

Overview
The OV360 course is designed as a guide for the end-user in the proper planning and installation of security for Ovation™ 2.4 and higher-level systems. Students will understand Ovation external and internal security concerns and learn how to apply safeguards. Students will install and configure Ovation compatible Windows Server 2003 Domain Controllers, Windows XP service packs and Windows security patches. Students will configure Ovation security using the Ovation Security Manager.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Identify and explain Ovation™ specific internal and external security threats
- Plan and implement Ovation software installation including Windows 2003 Server, Windows service packs and Windows security patches
- Describe the function of the Ovation Security Manager
- Create and manage user accounts, computer accounts and Ovation roles and group policies
- Create and manage Ovation point security groups
- Manage and understand domain policies
- Create and manage Ovation domain administrators
- Design and implement a specific Ovation security configuration
- Explore the Windows group policy objects

Prerequisites
Ovation – System Administration – OV230

Ovation™ - Security Center - OV365

Overview
The OV365 consists of a suite of security modules designed to assist the end-user in reducing the cost of complying with the NERC CIP standards. The security modules functions include Vulnerability Scan and Patch Management (VSPM), Malware Prevention (MP) and Security Incident and Event Management (SIEM). The course covers the configuration, implementation and administration of the modules. The course supports Ovation™ 2.4 and newer for the Windows environment and Ovation 1.7.2 and newer for the Solaris environment.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Identify the modules of the Ovation™ Security center
- Demonstrate the Patch Management module
- Demonstrate the Malware Prevention module
- Demonstrate the Security Incident and Event Management module
- Demonstrate the Anti-Virus module
- Implement new Virtual Machines into the Virtual Host machine
- Recommend proper management techniques for the modules

Prerequisites
Ovation – Network Administration – OV320 and Ovation – Security Administration - OV360
Ovation™ - Security Center – Virtual - OV365V

Overview
The OV365 consists of a suite of security modules designed to assist the end-user in reducing the cost of complying with the NERC CIP standards. The security modules functions include Vulnerability Scan and Patch Management (VSPM), Malware Prevention (MP) and Security Incident and Event Management (SIEM). The course covers the configuration, implementation and administration of the modules. The course supports Ovation™ 2.4 and newer for the Windows environment and Ovation 1.7.2 and newer for the Solaris environment.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Identify the modules of the Ovation™ Security center
- Demonstrate the Patch Management module
- Demonstrate the Malware Prevention module
- Demonstrate the Security Incident and Event Management module
- Demonstrate the Anti-Virus module
- Implement new Virtual Machines into the Virtual Host machine
- Recommend proper management techniques for the modules

Prerequisites
Ovation – Network Administration – OV320 and Ovation – Security Administration - OV360

Ovation™ - Serial Link Controller/RLC - OV295

Overview
The OV295 - Virtual offered course provides the end-user with the knowledge of how to create specialized I/O links to non-Ovation™ field devices using both serial-link modules and the Ovation Ethernet Highway. Topics include configuring and loading link controller modules, creating third-party points, memory mapping, adding third-party drivers to controllers and the Ovation addressing requirements.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Understand the architecture and functionality of the Ovation™ Fast Switched Ethernet highway and the need to protect it from external sources
- Apply the RLC module
- Define MAC and IP addressing and Ethernet protocols
- Understand how Ethernet switches work
- Understand the various options for connecting third-party I/O to the Ovation highway
- Understand the Modbus register concept
- Understand the Modbus commands available in Ovation releases
- Apply and install Ovation Modbus drivers
- Apply and build Ovation point records for communication to Modbus
- Verify successful communications between Ovation and the PC Modbus simulation

Prerequisites
Ovation – Data Acquisition – OV100 and Ovation – Building and Maintaining Ovation Control – OV200

Ovation™ - Serial Link Controller/RLC – Virtual - OV295V

Overview
The OV295 - Virtual offered course provides the end-user with the knowledge of how to create specialized I/O links to non-Ovation™ field devices using both serial-link modules and the Ovation Ethernet Highway. Topics include configuring and loading link controller modules, creating third-party points, memory mapping, adding third-party drivers to controllers and the Ovation addressing requirements.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Understand the architecture and functionality of the Ovation™ Fast Switched Ethernet highway and the need to protect it from external sources
- Apply the RLC module
- Define MAC and IP addressing and Ethernet protocols
- Understand how Ethernet switches work
- Understand the various options for connecting third-party I/O to the Ovation highway
- Understand the Modbus register concept
- Understand the Modbus commands available in Ovation releases
- Apply and install Ovation Modbus drivers
- Apply and build Ovation point records for communication to Modbus
- Verify successful communications between Ovation and the PC Modbus simulation

Prerequisites
Ovation – Data Acquisition – OV100 and Ovation – Building and Maintaining Ovation Control – OV200
Ovation™ - SIEM - Report Building - OV366

**Overview**
The OV366 course focuses on Security Incident and Event Management (SIEM) reporting through the Nitroview/McAfee SIEM module of the Ovation™ Security Center. The course centers on managing preloaded templates, manipulating the templates and also creating reports utilizing the report building features of the SIEM. Attendees will have a clear understanding of the available templates and demonstrate the ability to add, modify, delete and export reports upon completion.

**Topics**
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Describe the basic functions of the Security Incident and Event Management tool
- Identify differences between Signature and Normalized ID’s and how they are essential to reporting
- Identify the templates available and how they relate to different regulations and determine the most useful
- Locate the area where reports are saved
- Demonstrate knowledge of SIEM report building features
- Build reports using the correct templates
- Replace already built templates with custom templates
- Prepare reports for export to a Windows machine

**Prerequisites**
Ovation - Network Administration – OV320, Ovation - Security Administration – OV360 and Ovation - Security Center - OV365

Ovation™ - SIEM - Report Building – Virtual - OV366V

**Overview**
The OV366 course focuses on Security Incident and Event Management (SIEM) reporting through the Nitroview/McAfee SIEM module of the Ovation™ Security Center. The course centers on managing preloaded templates, manipulating the templates and also creating reports utilizing the report building features of the SIEM. Attendees will have a clear understanding of the available templates and demonstrate the ability to add, modify, delete and export reports upon completion.

**Topics**
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Describe the basic functions of the Security Incident and Event Management tool
- Identify differences between Signature and Normalized ID’s and how they are essential to reporting
- Identify the templates available and how they relate to different regulations and determine the most useful
- Locate the area where reports are saved
- Demonstrate knowledge of SIEM report building features
- Build reports using the correct templates
- Replace already built templates with custom templates
- Prepare reports for export to a Windows machine

**Prerequisites**
Ovation - Network Administration – OV320, Ovation - Security Administration – OV360 and Ovation - Security Center - OV365

Ovation™ - Smart Process Global Performance Advisor - OV315

**Overview**
The OV315 course is designed for the end-user who will install, maintain and/or use the Global Performance Advisor (GPA) in power plants. It offers a good resource to those who have not purchased a GPA but are interested in understanding the true potential of a GPA. The course describes the capabilities and limitations of a GPA, hardware and software requirements and provides exercises to install, use and backup the GPA. Hands-on exercises to include: Building Feed-Water Heater Performance Calculations, Building Steam Turbine Performance Calculations and Building Condenser Calculations.

**Topics**
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Identify and explain the GPA’s capabilities and limitations
- Recognize the process data required to use the GPA effectively
- Understand GPA hardware and software requirements
- Load GPA software on a Workstation
- Create and reopen GPA projects and Workspaces
- Understand GPA tools and algorithms
- Understand Data Agents
- Create tags and import data
- Build and display example performance calculations
- Recognize communication techniques
- Understand backing up a GPA system

**Prerequisites**
Basic knowledge in power plant processes, Microsoft Windows Operating System, Ovation™ hierarchy of drops.
Ovation™ - Software Project - OV215

**Overview**
The OV215 course was designed for end-users that require a good overall understanding of the Ovation™ system software utility packages. The course contains selected elements from the OV100, OV200, OV210, OV230 and OV300 courses. The topics covered include Ovation application functions: Developer Studio, process-point building, creating and modifying process control sheets and graphics, backing-up MMI’s and the Domain Controller.

**Topics**
Upon successful completion of this course, using the reference material provided, and the student will be able to:
- Identify the major components of an Ovation™ system
- Understand basic Ovation terminologies
- Demonstrate basic Ovation Operator functions
- Understand data movement within the Ovation system
- Understand the hierarchy and basic functions within the Ovation Developer Studio
- Use the Ovation Developer Studio to create process points
- Monitor control previously implemented in an Ovation system
- Interpret and tune implemented control using available tools
- Build and modify control schemes using the Developer Studio
- Interpret and modify tracking schemes to meet specific control requirements
- Recognize the relationship between control schemes and graphic diagrams
- Implement given control requirements using the Developer Studio
- Evaluate and determine the proper operation of a control scheme using the tools and methods provided

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Ovation™ - Steam Turbine Mechanical Hydraulics - OV375

**Overview**
The OV375 course is designed to give the end-user expert knowledge of the Emerson Mechanical Hydraulic products. Students will learn how to maintain the Emerson Equipment.

**Topics**
Upon successful completion of this course, using the reference material provided, the student will be able to:
- Understand the basic function and turbine components
- Identify primary hydraulic components, pumps, accumulators and etc.
- Trace components using hydraulic diagrams and drawings
- Identify and describe operational characteristics of directional, proportional and servo valves
- Identify common problems with LVDT, settings, RVP basic settings and etc.
- Understand the Speed Probe operation
- Demonstrate knowledge on hydraulic oil used type, temperature, gasket materials, tank filling and the need for cleanliness.

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Ovation™ - System Administration - OV230

**Overview**
The OV230 course was designed for the end-user charged with maintaining the integrity of the Ovation™ DCS. Students who attend this course will learn all the configuration parameters of the Ovation Developer Studio tree (ex. Quality Configuration, Alarm Configuration, Point Review Configuration, Right Click Menu Configuration), as well as all right click functions (ex. Control functions, Search, Engineer, Back/Restore). Backups will be discussed in detail and each student will perform a database restore.

**Topics**
Upon successful completion of the course, using the reference material provided, the student will be able to:
- Navigate and understand the Ovation™ Developer Studio
- Understand Ovation system licensing
- Implement Process control and user security in the Ovation system
- Apply system configuration changes to the Ovation system
- Add new and modify existing drops to the Ovation system
- Navigate and understand Ovation file systems, structure, sharing and security
- Backup the Ovation database and required files to various media
- Load an Ovation system
- Recover the Ovation database and required files from backup
- Understand upgrading and maintaining the Ovation hardware
- Use Developer Studio to implement given control requirements
- Map and share directories and files in the Windows environment

**Prerequisites**
OV100 and OV200 highly recommended
Ovation™ - System Troubleshooting - Advanced - OV305

Overview
The OV400 course is offered to the end-user as a stand-alone or web-based exam or implemented with a pre-testing review at the Training Center. The student's proficiency is measured in areas related to database building, control implementation, control graphic linkage and troubleshooting on a system-wide basis. For both offerings, a multi-point examination is administered, and participants are required to achieve a grade score >80% to successful gain certification.

Topics
Upon completion of this course and achieving a successful level of competency in the online examination, the student will receive an Ovation™ certification award. This achievement affirms and recognizes that the student is fully cognizant and possesses the necessary skills to successfully engineer and maintain an Ovation control system for their organization. Student proficiency has been demonstrated in the following areas:

- Building saving and implementing the Oracle database
- Constructing control sheets using both Boolean and Analog logic
- Loading and configuring the Ovation™ Controller
- Designing graphics with control implementation
- Troubleshooting procedures as related to I/O and Controller modules

Ovation™ - Third Party ELC/Troubleshooting - OV296/OV300

Overview
The OV296/OV300 is a combined and condensed version of the two courses. Offered over a 5-day period the condensed course will enable the students to configure, network, troubleshoot the Ethernet Link Controllers, third-party I/O and the Ovation™ system as-a-whole. Students will configure an ELC in Developer Studio and learn best practices when troubleshooting the Ovation DCS.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Configure third-party points
- Explain the purpose of an ELC and its addressing
- Download firmware to ELC module
- Interpret DCS error messages
- Perform systematic approach to fault analysis; isolate & correct the fault

Ovation - Troubleshooting Using Applications - OV11

Overview
This 5-day course, as the title suggests, is to understand how to troubleshoot using the alarm package, point information and control logic. Trending, point review and system viewer are also presented. These necessary software tools are available without the use of Ovation Studio. Explore a device’s alarm through point information and/or control schemes. Understand a controller’s fault diagnostics using system status and system viewer. This course is taught with the support of Ovation workstations and controllers.

Topics
1. Review the major components of a typical Ovation Distributed Control System
2. Review usage of Ovation Applications
3. Utilize the Ovation Applications for live troubleshooting of processes and instruments

Prerequisites
Ovation - Data Acquisition – OV100, Ovation - Building and Maintaining Ovation Control – OV200 and Ovation - Building Ovation Graphics - OV210

Ovation™ - Troubleshooting - OV300

Overview
The OV300 course is designed to provide the end-user with the skills and methods to troubleshoot and repair faults in the data acquisition and control functions of the Ovation™ system. Students will be required to isolate faults through-out the signal path- from field terminations to I/O modules, through the controller, across the network and onto the graphic display. Multiple problem scenarios will be presented.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

- Identify and resolve selected hardware, system administration and software problems
- Troubleshoot the system using documentation and available tools to analyze system faults or problem conditions
- Interpret system error messages
- Recognize and resolve problems with the system administration tool
- Using a systematic approach to fault analysis, isolate and correct selected network, port and printer faults
Overview
The OV370 is designed to afford the end-user with in-depth knowledge on the Ovation™ Turbine Control System (TCS). A hydraulic test stand with LVDT's and Servo Valves will be used to demonstrate turbine operation and graphics. The course includes defining I/O points, RVP and speed modules, calibration and troubleshooting exercises of the speed detector and valve positioner modules. Students will also demonstrate RVP card tuning.

Topics
Upon successful completion of this course, using the reference material provided, the student will be able to:

• Review the history of the steam turbine
• Review and evaluate typical turbine control logic
• Discuss the LVDT and speed probe functionality
• Configure I/O points for RVP and speed cards
• Configure and set up the RVP and speed I/O modules
• Using a hydraulic valve test stand connect an LVDT and servo valve for simulation
• Discuss troubleshooting procedures for LVDT's and servo valves
• Discuss and setup hyperlink terminal to RVP cards
• Perform LVDT tests and setup using the valve calibration graphic and hyperlink terminal
• Tune the RVP card in conjunction with the hydraulic test stand
• Using a speed wheel test the speed probes

Prerequisites
Ovation – Data Acquisition – OV100 and Ovation – Building and Maintaining Ovation Control – OV200
### PLC - Controller Maintenance - Logic Developer – 7700
**CEUs – 0**

#### Overview
The Controller Maintenance - Logic Developer PLC course provides the student with the skills necessary to troubleshoot and repair faults in PLCs (90-30, 90-70, VersaMax, RX7i and RX3i).

The class is taught using Logic Developer PLC software, which is part of the Machine Edition family of products and features the PACSystems RX3i Controller. The focus is on interpreting existing ladder logic programs for troubleshooting purposes. Students are taught how to use the troubleshooting tools to determine where faults have occurred and how to correct them.

#### Topics
- Control System Fundamentals
- Application components and Logic Structure
- Basic Controller Variables, Data Types, and Numbering Systems
- Controller Scan
- Controller Hardware Overview
- System Hardware Components
- Finding Information
- Operating Proficy Machine Edition
- Orientation to programming environment and tools
- "Best-Kept Secrets"
- Projects and Targets
- Configuring Controller and I/O
- Configure Controller, I/O, and Option Modules
- Status indicators
- Assign Reference Addresses
- Hardware Reference View
- Import/Export
- Reports
- Working with Controllers
- Establish communications
- Project Validation
- Upload / Download / Verify
- Fault Tables
- Controller Status
- Working with Variables
- Variable concepts
- Variable Types
- Variable Access
- Variable attributes
- Introduction to LD Programming
- Basic operation
- LD Editor
- Basic LD logic elements (contacts, coils, counters, timers, and relational operators)
- Monitor LD logic execution
- Monitor Application Variables
- Data Watch, Data Monitor Utility, and Reference View Tables
- Modify application Variables
- Using Variable References

### PLC - Controller Maintenance - Logic Developer – 7700 – Continued...

- Monitor Controller Without Original Project
- Modify Existing Program
- Working with Rungs
- Entering LD Logic
- Connecting LD Logic
- Creating New Variables
- Controller Equality Status
- Equality Status indicators
- Determine Controller component equality
- How to gain Controller and Project Equality
- Manage Controller Forces
- Detect and locate Controller Forces
- Clear and Unforce Variables
- Application Troubleshooting
- Using Search, Cross References, and References
- Controller and I/O Faults
- Use Faults to diagnose system issues
- Fatal and Nonfatal Faults
- Clear and print Faults
- Save Fault Tables to file

#### Audience
This course is intended for anyone who will be troubleshooting GE Intelligent Platforms PLC control systems using Proficy Logic Developer PLC Machine Edition software. The course is designed for electrical technicians, electricians, and/or engineers beginning to work with Logic Developer PLC, who will be tasked with modifying and maintaining PLC programs and hardware.

#### Prerequisites
Participants should be comfortable operating in a Microsoft Windows environment, and have a basic understanding of electrical/control fundamentals.

### PLC - Controller Programming - Logic Developer – 7701
**CEUs – 0**

#### Overview
Learn programming for PACSystems, 90/70, 90/30, and VersaMax controllers in this Machine Edition class featuring the PACSystems RX3i Controller. This class covers programming techniques and the advanced features of the PACSystems Controller using Logic Developer PLC Machine Edition software. Starting with the controller software architecture, students are taught how to effectively develop control applications using building block concepts.

This course builds upon Object-Oriented concepts with PACSystems User-Defined Function Blocks (UDFBs), as well as the development of application components using Ladder Diagram (LD), Structured Text (ST), and Function Block Diagram (FBD) programming languages. An optional PROFINET module is available.

#### Topics
- Control System Fundamentals
- Application components and Logic Structure
- Basic Controller Variables, Data Types, and Numbering Systems
- Controller Scan
- Operating Proficy Machine Edition
- Orientation to programming environment and tools
- "Best-Kept Secrets"
- Projects and Targets
- Machine Edition Options
- Working with Controllers
- Establish communications
- Project Validation
- Upload / Download / Verify
- Fault Tables
- Controller Status
- Controller Hardware Overview
- System Hardware Components
- Finding Information
- Configuring Controller and I/O
- Configure Controller, I/O, and Option Modules
- Status indicators
- Assign Reference Addresses
- Hardware Reference View
- Import/Export
- Reports
- Ladder Diagram Basics
- Ladder Diagram (LD) programming language basics
- Simple LD program with Contacts and Coils
- Assigning Variables
- Toolchest Drawer usage
- Proficy Machine Edition Toolchest
- Create and Share Toolchest Drawers
PLC - Controller Programming - Logic Developer – 7701
Continued...
- Saving, using, and modifying Toolchest logic
- Universal Variables "$"
- Online Monitoring Tools
- Logic Monitoring
- Data Watches
- Reference View Tables
- Data Monitor
- Online Application Modification
- Program changes while Controller is running
- Word-for-Word, Run Mode Store, and Test Edit
- Contacts and Coils
- Series and Parallel LD logic
- System Bits
- Find Variable references
- Monitor, modify, and force Boolean Variables
- Program Flow Operations
- Controller Block Architecture
- Operation of _MAIN and Interrupt Blocks
- Create and call Program Blocks
- Including Toolchest Program Blocks
- Timers and Counters
- Timer and Counter Instance Data
- Conversion Operations
- Change data display formats in LD Editor
- Math Operations
- Typed Instructions
- Change Variable data values directly in LD Editor
- Relational Operations
- Understand the basic operation of LD Relational instructions.
- Data Operations
- Initialize application data using Data Move Functions
- Basic Shift Register operation
- Control Operations
- PID Function Block
- Service Request Function
- Display Controller ASCII String information
- Bit Operations
- Masked Compare Function
- Working with Variables
- Variable concepts
- Variable Types
- Variable Access
- Variable attributes
- FBD Programming
- Create FBD Blocks and Logic
- Logic solve order
- FBD Comments and Instructions
- Edit and wire FBD logic
- Negative Boolean flow
- Assign FBD logic variables
- Change online values
- Monitor FBD logic
- Call UDFBs
- Editor configuration options
- Print logic

PLC - Controller Programming - Logic Developer – 7701
Continued...
- FBD programming considerations
- Programming Guidelines
- Program organization and naming conventions
- User Defined Function Blocks
- UDFB Input, Output, and Member Variables
- UDFB operationCreate and monitor UDFB
- UDFB Toolchest considerations
- Update existing UDFB
- Introduction to PROFINET [OPTIONAL]
- PROFINET overview
- PROFINET resources

Audience
This course is intended for those who are or will be involved in the development, modification, and troubleshooting of control systems using Proficy Logic Developer PLC and PACSystems Controllers.

Prerequisites
Participants should be comfortable operating in a Microsoft Windows environment, and have a basic understanding of electrical/control fundamentals.

PLC - Operator Interface Programming - QuickPanel & View – 7702
Overview
The Operator Interface Programming - QuickPanel & View course familiarizes the student with operating in the Proficy View Machine Edition development environment, the QuickPanel+ machine level operator interface, creating operator interface graphical panels, writing scripts, configuring alarm & logging schemes, and running Projects on the operator interface device. Students are also introduced to the built-in Data Historian, Web Publishing, and Web Documents. An experienced instructor guides the student using demonstrations and hands on lab exercises.

Topics
- Introduction to Operator Interfaces
- Basic HMI Types, Benefits of an Operator Interface
- Introduction to QuickPanel+ and to Proficy View
- Open HMI Project, Download and Run on QuickPanel+
- Operating Proficy Machine Edition
- Use the Toolchest for HMI development.
- Create a new Project with Logic and HMI Components.
- Download and Run Project Using the Simulator.
- Going Online and use the Quick Test.
- Download and Run Project on QuickPanel+
- Map the Machine Edition Controller\'s I/O.
- Create an HMI Project
- Working with View Targets in a Project.
- Configure PLC Access Drivers.
- Use Variables shared from a Controller Project.
- HMI Development Tools
- Build Operator Interface Panels using the Proficy View Graphic Editor and graphic drawing tools.
- Use Basic, Dynamic, Interactive, and Complex graphical objects.
- Animate objects and modify their appearance.
- Use Indexed Image and Message Grids.
- Create and Download an HMI Project Process Summary screen.
- Scripting
- Recognize how to apply scripts.
PLC - Operator Interface Programming - QuickPanel & View – 7702
Continued...

- Find help for scripting language commands, keywords, & functions.
- Create Panel, Application, & Touch Animation scripts.
- Validate, Run, & Debug an Active Script.
- Logging and Analyzing Data
- Create Logging Groups.
- Assign Project Variables to logging groups.
- Use TrendX chart to view logged data.
- Create a Chart object and view real-time data.
- Configure the View Historian Collector to archive device data.
- Alarms
  - Differentiate variable alarm categories.
  - Create and configure alarm groups.
  - Assign alarms and alarm limits to Project Variables.
- Log Alarm Data and Track Alarm Events.
- Set up an alarm history file.
  - Web Publishing and Access.
  - Configure content for Web Access by publishing data.
  - Create custom Web Documents.
  - Interact with Project data through remote viewing.
- Conversion to QuickPanel+
  - QuickPanel to QuickPanel+conversion considerations.
  - Convert QuickPanel Project to QuickPanel+.

Audience
This course is designed for programmers, operators, and application designers who are beginning to work with the QuickPanel+ Operator Interface that is programmed using Proficy View, who will be tasked with developing, modifying, and maintaining Operator Interface applications.

Prerequisites
Participants should be comfortable operating in a Microsoft Windows environment, and have a basic understanding of control fundamentals.

PLC - Proficy Process Systems - Fundamentals - 7703
Overview
The Proficy Process Systems Fundamentals course is designed to provide a good working knowledge of Proficy Process Systems. This course explores the solution architecture, features and configuration tools from the controller, through Data Acquisition and Management to Visualization. Valuable hands-on lab exercises are provided to guide students through the building and modification of the system and its constituent components.

Topics
- Introduction to Proficy Process Systems
- An overview of the Proficy Process Systems and its solutions
  - Eng. Workstation: Controllers & IO
- Use the EWS to prepare a PPS controller
- Creating a Project
  - Configure fundamental project settings to prepare for development.
  - Hardware Configuration
  - Configure the controllers.
- Programming with Logic Developer
  - Provide an orientation to the control programming environment.
  - PPS Function Blocks
  - Use PPS Function Blocks to build controller logic.
  - Ethernet Global Data (EGD)
- See how the Global Namespace is constructed and driven by EGD.
- EWS- CIMPLICITY Project Essentials
  - Prepare CIMPLICITY for PPS visualization.
  - EWS- IFIX Project Essentials
  - Prepare IFIX for PPS visualization.
- EWS- CIMPLICITY visualization
  - Use CIMPLICITY to build displays using PPS faceplates and the Global Namespace.
- EWS-IFIX visualization
  - Use IFIX to build displays using PPS faceplates and the Global Namespace.
- Hardware and IO Networks
  - Receive an overview of PPS Hardware and IO design principles.
- Controller-Based Alarming
  - Set Alarming in the Controllers.
  - Building Alarm Displays – CIMPLICITY
  - Use EWS-CIMPLICITY to view alarms.

Audience
This course is designed for process, automation or instrumentation engineers and system integrators who will be developing, configuring and using applications on a fully integrated Proficy Process System.

Prerequisites
Participants should have a working knowledge of Windows operating systems. Control Systems experience and knowledge is an asset.
PROVOX - Batch Control Config. Using ENVOX PROVUE – 5290 CEUs - 3.2

Overview
This 4-1/2-day course will concentrate on the batch functionality for the SR90/SRX controller. The console resident activity point will also be covered. At the completion of this course the student will be able to:
- configure Operations and Unit Points to control a batch process
- create Procedures, Point Sets and Console Activity Points
- create console Batch End Reports
- perform advanced scripting for the PROVOX Operator Console

Topics
- Unit and Operation Configuration
- Multiple Units and Operations
- Activity and Procedure Configuration
- Point Sets and Acquire Sets for Parallel Processes
- Batch End Reporting

Audience
This course is designed for process control and maintenance engineers, and operations personnel responsible for the configuration of a fully functional Unit Operations Controller and operator interface.

Prerequisites
With the retirement of the PROVOX product line in 2013, these courses can only be assured to customers with a Sustain Support Agreement. A Sustain Support Agreement can be customized to meet your needs for future support-taking into consideration your onsite resources and schedule for modernization. Please contact your local office to learn more about Sustain Support.

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PROVOX - Cont. Contr. Config Envox & POC - Advanced – 5390 – Continued...

Topics
- Advanced Point Configuration
- Logic Control Points
- Loop Points
- Enhanced DCD's
- Graphics Studio Scripting
- Dynamos for Graphics Studio

Prerequisites
Course 5190, PROVOX System Configuration Using ENVOX and PROVOX Operator Console

Overview
Contact the registration office for class information at education@emerson.com or 800-338-8158.

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PROVOX - Continuous Control Config - ENVOX & OWP – 5370 CEUs - 3.2

Overview
This 4-1/2-day course teaches students advanced configuration of the OWP Console and the controller used for continuous process control. At the completion of this course, students will be able to:
- perform advanced OWP Console point operations
- create and modify Cascade Loops, advanced DCDs, and Group Points
- create Function Sequence Tables (FSTs) and Logic Control Points (LCPs)
- create and download an advanced OWP Console configuration
- utilize Trace/Tune software to troubleshoot FST programs
- use the display editor to create basic and advanced displays
- create Console Reports

Topics
- Advanced Point Configuration
- Logic Control Points
- Cascade Loop Control
- Enhanced DCDs
- Intelligent Device Interface (Optional)
- Advanced Display Creation

Audience
This course is designed for process control and maintenance engineers, and operations personnel responsible for the configuration of an Operator Workplace Console and IFC/IUC SR90/SRX Controller using ENVOX on a DEC-Based Platform.

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PROVOX - Continuous Control Config - ENVOX & OWP – 5370 – Continued...

Prerequisites
With the retirement of the PROVOX product line in 2013, these courses can only be assured to customers with a Sustain Support Agreement. A Sustain Support Agreement can be customized to meet your needs for future support-taking into consideration your onsite resources and schedule for modernization. Please contact your local office to learn more about Sustain Support.

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PROVOX - Continuous Control Config - ENVOX & OWP – 5371 CEUs - 3.2

Overview
This 4-1/2-day course teaches students advanced configuration of the OWP Console and the IFC device used continuous process control.
- create/modify Cascade Loops, and Group Points using Control Desktop software
- ENVOX software- create Enhanced DCD's
- create Logic Control Points (LCP's) and their Function Sequence Tables (FST's) using CD software with ENVOX
- create/download adv. OWP configuration
- troubleshoot FST programs with Trace/Tune
- create adv. displays- ENVOX display editor
- create Console Reports
PROVOX - Continuous Control Config Using ENVOX – 5360
CEUs - 3.2

Overview
This 4-1/2-day course teaches students advanced configuration of the PROVUE Operations Console and the controller used for continuous process control. At the completion of this course, students will be able to:

- perform advanced PROVUE Console point operations with multiple PPAs, PMAs, and alarm priorities
- create and modify a Cascade Loop, advanced DCDs, and Group Point
- create Function Sequence Tables (FSTs) and Logic Control Points (LCPs)
- create and download an advanced PROVUE Console configuration
- utilize Trace/Tune software to troubleshoot FST programs
- use the display editor to create basic and advanced displays create Console Reports

Topics
- Advanced Point Configuration
- Logic Control Points
- Cascade Loop Control
- Advanced Display Creation

Audience
This course is designed for process control engineers, maintenance engineers, and operations personnel responsible for the configuration of a PROVUE Operations Console, SR90/90S Controller, using ENVOX on a DEC-Based Platform.

Prerequisites
With the retirement of the PROVOX product line in 2013, these courses can only be assured to customers with a Sustain Support Agreement. A Sustain Support Agreement can be customized to meet your needs for future support-taking into consideration your onsite resources and schedule for modernization. Please contact your local office to learn more about Sustain Support.

PROVOX - Mastering FST's – 5375
CEUs - 3.2

Overview
This 4-1/2-day course uses lectures and hands-on activities to teach students the strength and versatility of the FST control language. The course stresses learning the programming fundamentals and using them to solve control problems. Students use a software emulation package as a learning tool and as an FST development tool. Students who complete this course will be able to:

- demonstrate increased productivity and optimum creativity in writing effective FST programs
- maintain FSTs in an existing system without disturbing the on-line system
- develop FSTs from logic diagrams of the control system
- test their own control solution techniques before establishing them

The software simulation program used in the course FSTeacher is available
- As an optional add-on to the course fee. For more information, call 800-338-8158 or 641-754-3771.

Prerequisites
Students should have experience configuring PROVUE IFC or UOC devices and have completed at least one of the following courses: 5200, 5260, 5270, 5300, 5320, 5370 or 5391.

PROVOX - System Config Using ENVOX
DEC - Introduction – 5160
CEUs - 3.2

Overview
This 4-1/2-day course teaches the base configuration of a PROVOX console and controller using ENVOX configuration software. A controller containing Data Acquisition Points, DCD's and loop points will be created. The student will also configure a functional PROVUE Console including displays, PMA's, and PPA's, using ENVOX configuration software. Students who complete this course will be able to:

- perform PROVUE Console operations
- use the ENVOX software to create, modify, and document the PROVOX database elements
- IFC/UOC, SR90/9RX
- create, modify, and delete Data Acquisition, DCD and Loop Points
- create, generate and download a basic PROVUE Console configuration containing PPA's and PMA's, and basic displays

Topics
- PROVUE Console Configuration
- Envox Configuration Software
- Provox Basic Point Configuration

Audience
This course is for process control engineers, senior maintenance technicians, and supervisory personnel responsible for specifying and configuring a PROVOX system using ENVOX on a DEC-Based Platform. This course will include the basic configuration for the PROVUE console and an SR90/SRX controller.

Prerequisites
With the retirement of the PROVOX product line in 2013, these courses can only be assured to customers with a Sustain Support Agreement. A Sustain Support Agreement can be customized to meet your needs for future support-taking into consideration your onsite resources and schedule for modernization. Please contact your local office to learn more about Sustain Support.

PROVOX - Syst. Config. Using ENVOX & POC (VAX-Based) – 5190
CEUs - 3.2

Please call the registration office in Marshalltown, IA to inquire about dates and to enroll in this course. The phone number is 800/338-8158 or 641/754-3771.
Overview
This 4-1/2-day course teaches configuration of a SR90/SRX controller and DeltaV Operate for PROVOX Console. Students will configure the controller to do automatic control of a simulated process and a PROVOX Operator console to be used as an operator interface. Students who complete this course will be able to:

- complete the basic configuration for an SR90/SRX controller, to include basic device and database definition, I/O definition and data acquisition points
- use Control Desktop to configure the DeltaV Operate for PROVOX Console device definition and point alarm handling
- use DeltaV Run and the DeltaV Configure mode to create and test basic operator displays
- use Control Desktop software to create, copy and modify PROVOX database elements
- generate and download a basic DeltaV Operate for PROVOX Console Configuration containing PPA's, PMA's, and basic displays

Topics
- DeltaV Operate for PROVOX Console Configuration
- Control Desktop Configuration Software with ENVOX
- PROVOX Basic Point Configuration

Audience
This course is designed for process control engineers, senior maintenance technicians, and supervisory personnel responsible for using ENVOX P5.0 Control Desktop software to configure a DeltaV Operate for PROVOX Console and either a SR90 or SRX Controller. This course is the prerequisite for the Advanced Continuous and Batch Schools.

Prerequisites
With the retirement of the PROVOX product line in 2013, these courses can only be assured to customers with a Sustain Support Agreement. A Sustain Support Agreement can be customized to meet your needs for future support-taking into consideration your onsite resources and schedule for modernization. Please contact your local office to learn more about Sustain Support.
## PROVOX - System Configuration Using ENVOX & OWP - Introduction – 5170
### Overview
This 4-1/2-day course teaches the base configuration of an OWP and controller using ENVOX configuration software. A controller containing Data Acquisition Points, DCD's and loop points will be created. The student will also configure a functional Operator Workplace Console including displays, PMA’s, and PPA’s using ENVOX configuration software. Students who complete this course will be able to:
- perform OWP console operations
- use the ENVOX software to create, modify, and document the PROVOX database elements
- create, generate and download an IFC/UOC controller
- create, modify, and delete Data Acquisition, DCD and Loop Points
- create, generate and download a basic OWP configuration containing PPA’s, PMA’s and basic displays

### Topics
- OWP Console Configuration
- ENVOX Configuration Software
- PROVOX Basic Point Configuration

### Audience
This course is designed for process control engineers, senior maintenance technicians, and supervisory personnel responsible for specifying and configuring an OWP based PROVOX DCS Operations Console and controller. This course will include the basic configuration for the operator workplace console (OWP) and an SR90/SRX controller using ENVOX on a DEC-Based Platform.

### Prerequisites
With the retirement of the PROVOX product line in 2013, these courses can only be assured to customers with a Sustain Support Agreement. A Sustain Support Agreement can be customized to meet your needs for future support-taking into consideration your onsite resources and schedule for modernization. Please contact your local office to learn more about Sustain Support.

## PROVOX - Systems H/W SR-90 & SRX-IFC/UOC Controllers – 5503
### Overview
This 7-1/2-day hands-on course covers hardware/troubleshooting of the data highway, console, and SRx Controller with serial I/O using ENVOX diagnostic tools.

### Topics
Hardware/Troubleshooting of:
- PROVOX Data Hwy II;
- Control (serial) I/O Hardware; - Intelligent
- Device Interface (IDI);
- SRx Controllers;
- PROVOX Operations (POC) Console;
- DC Power System; ENVOX Diagnostics; Downloading/Databases; Communications (PROVOX & Ethernet)

### Audience
This course is for those responsible for the hardware/troubleshooting of a PROVOX system.

### Prerequisite
With the retirement of the PROVOX product line in 2013, these courses can only be assured to customers with a Sustain Support Agreement. A Sustain Support Agreement can be customized to meet your needs for future support-taking into consideration your onsite resources and schedule for modernization. Please contact your local office to learn more about Sustain Support.
**Regulators and Relief Valves - Gas Regulator Technician – 1100 CEUs - 2.1**

**Overview**
This 3-day course is designed primarily for technicians responsible for the installation and maintenance of natural gas regulators. Emphasizing hands-on training, this course teaches students to install, troubleshoot, and adjust gas regulators. Students who complete this course will:
- perform maintenance on regulators and relief valves
- troubleshoot field problems

**Topics**
- Self-Operated Regulator Fundamentals
- Pilot-Operated Regulator Fundamentals
- Overpressure Protection
- Sizing Overview for Technicians
- Regulator Troubleshooting Principles, Procedures, and Best Practice
- Failure Analysis
- Stability Issues
- Installation Practices
- Pilot Interchangeability Practices
- Advanced Monitor Operations and Maintenance

**Audience**
This course is designed primarily for technicians with responsibility for installing, maintaining, and troubleshooting gas regulators.

**Prerequisites**
At least one year’s field experience with natural gas regulators is recommended.

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**Regulators and Relief Valves - Gas Regulator Troubleshooting – 1106 CEUs - 2.1**

**Overview**
This 3-day course provides intensive hands-on training using the same regulators that are commonly used in the field. Actual gas regulator problems are simulated in the workshops, challenging the student to efficiently diagnose problems and restore the regulator to proper operation. Students who complete this course will:
- efficiently and safely troubleshoot common regulator operational performance problems
- understand the influence of the service environment on regulator performance
- understand the importance of correct installation procedures
- understand the role of correct sizing as it impacts regulator performance
- perform maintenance on regulators and relief valves
- troubleshoot field problems

**Topics**
- Review:
  - Self-Operated Regulator Fundamentals
  - Pilot-Operated Regulator Fundamentals
  - Overpressure Protection
  - Sizing Overview for Technicians
  - Regulator Troubleshooting Principles, Procedures, and Best Practice
  - Failure Analysis
  - Stability Issues
  - Installation Practices
  - Pilot Interchangeability Practices
  - Advanced Monitor Operations and Maintenance

**Audience**
This course is designed primarily for technicians responsible for the installation and maintenance of industrial regulators.

**Prerequisites**
1100 Gas Regulator Technician recommended but not required.

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**Regulators and Relief Valves - Industrial Regulator Technician - 1102 CEUs - 2.1**

**Overview**
Emphasizing hands-on training, this course teaches students to install, troubleshoot, and adjust regulators specific to the Industrial Market.

**Topics**
- Students who complete this course will be able to do the following:
  - perform maintenance on regulators
  - troubleshoot field problems

**Audience**
This course is designed primarily for technicians responsible for the installation and maintenance of industrial regulators.

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**Regulators and Relief Valves - Pressure / Vacuum Relieving Equipment - Technical Seminar – 1114 CEUs – 2.1**

**Overview**
As the world-wide leading provider of precision pressure relief devices with such brands as Anderson Greenwood, Crosby, and Varec, we are committed to providing the technical assistance needed to help designers and engineers meet pressure vessel code requirements and attain optimum pressure relief valve performance. Since 1970, these seminars have been conducted to assist in training for the design, installation, and operation of effective pressure relief systems. The seminar also serves as an excellent refresher course for experienced personnel and offers unique forums for the exchange of information, applications, and solutions.

**Topics**
- Principles of Operation
- ASME Pressure Vessel Code Requirements
- API Storage Tank Standards and Recommended Practices
- Advantages and Limitations of PRV Types
- Installation and Application of Pressure Relief Devices
- Pressure Relief Device Hands-on Circuit
- Assembly and Testing Facility Tour
- Operational Demonstrations of Devices at our ASME Certified Training Laboratory
- Choice of Pressure Relief Valve Sizing and Selection Workshop or Pressure Relief Valve Hands-on Troubleshooting, Inspection, Maintenance, and Reliability Workshop

**Audience**
Customers of Pentair Valves and Controls, Anderson Greenwood, Crosby, and Varec. This would include designers and engineers.
Regulators and Relief Valves - Principles of Self-Operated Regulators - e7601
CEUs - 0.5

Overview
This course introduces self-operated regulator fundamentals for those with newly assigned responsibilities for regulator selection, maintenance, or procurement. Upon completion of this module, students will be able to describe the construction components and operating principles behind most self-operated regulators. Students will be able to describe how changing some of these components will increase or decrease a regulator’s performance for a given application.

Students will develop the vocabulary necessary to describe the parts and working principles of self-operated regulators.

Audience
This course introduces self-operated regulator fundamentals for those with newly assigned responsibilities for regulator selection, maintenance, or procurement.

Regulators - Big Regulators Course - LPG-NH3 – 1112
CEUs – 2.1

Overview
This 3-day course emphasizes hands-on training, this course teaches students to install, troubleshoot, and adjust regulators as well as service and maintain valves. Students will have the opportunity to perform maintenance, replace components, and check products for performance measures using actual products and pressure.

Topics
• Perform maintenance on regulators and valves
• Troubleshoot field problems

Audience
This course is designed primarily for technicians responsible for the installation and maintenance of LPG and NH3 regulators and valves.
CEUs – 1.4

Overview
This 2-day course will provide a hands-on overview of API 21.1 standard for Electronic Gas Measurement and the Emerson FB1000/2000 Series Flow Computers. Participants are presented with the API standards while engaging in direct hands-on correlation to the flow computer’s features for measurement, auditing and archiving, and more. Gain the necessary knowledge to effectively installation, configuration and maintenance. Each student will be provided with a PC with preinstalled software and all necessary hardware and courseware for the duration of the class. Participants are encouraged to bring their PC.

Topics
- Introduction
  - Hardware Options
  - I/O Options
  - Calibrating the AI and AO
  - FBxConnect Software
  - Elements of Basic Configuration

Configuring the Flow Computer
- Communication Basics
- Setting the Flow Computer clock
- Alarm and Events Logs
- History layout
- Backing Up and Restoring Configurations
- Logic Blocks / Math Blocks
- Final Exercise
- Summary of course

Audience
This Remote Automation Solutions course is for engineers, technicians, and others involved with the configuration and operation of the FBXX series products.

Prerequisites
Participants should have a working knowledge of their application/process and should also have advanced PC knowledge and be thoroughly familiar with Microsoft Windows operating systems.

CEUs – 1.4

Overview
This 2-day course will provide a hands-on overview of API 21.1 standard for Electronic Gas Measurement and the Emerson FB1000/2000 Series Flow Computers. Participants are presented with the API standards while engaging in direct hands-on correlation to the flow computer’s features for measurement, auditing and archiving, and more. Gain the necessary knowledge to effectively installation, configuration and maintenance. Each student will be provided with a PC with preinstalled software and all necessary hardware and courseware for the duration of the class. Participants are encouraged to bring their PC.

Topics
- Introduction
  - Hardware Options
  - I/O Options
  - Calibrating the AI and AO
  - FBxConnect Software
  - Elements of Basic Configuration

Configuring the Flow Computer
- Communication Basics
- Setting the Flow Computer clock
- Alarm and Events Logs
- History layout
- Backing Up and Restoring Configurations
- Logic Blocks / Math Blocks
- Final Exercise
- Summary of course

Audience
This Remote Automation Solutions course is for engineers, technicians, and others involved with the configuration and operation of the FBXX series products.

Prerequisites
Participants should have a working knowledge of their application/process and should also have advanced PC knowledge and be thoroughly familiar with Microsoft Windows operating systems.

Remote Automation Solutions - ControlWave – Troubleshooting - RA331
CEUs - 1.8

Overview
This 2-1/2-day hands-on course covers the hardware, troubleshooting, configuration and maintenance of the ControlWave product family. This course will equip you with the necessary knowledge and practice needed to troubleshoot common problems and configure the ControlWave hardware. Learn to utilize software application programs to perform diagnostics and monitor live data and communication statistics.

Topics
- Overview of ControlWave Hardware
- Overview of OpenBSI Software Utilities
- Basic Troubleshooting
- Basic ControlWave Configuration

Audience
Field personnel whose responsibilities may include: installation, wiring, start-up, troubleshooting, configuration or maintenance of the ControlWave products. An individual who seeks a more thorough understanding of the ControlWave products.

Prerequisites
Participants must be thoroughly familiar with Windows 2000/ XP or later versions. Participants should have formal instrument technician training and a working knowledge of their application/process.
Overview
This 2 1/2-day hands-on course covers the hardware, troubleshooting, configuration and maintenance of the ControlWave product family. This course will equip you with the necessary knowledge and practice needed to troubleshoot common problems and configure the ControlWave hardware. Learn to utilize software application programs to perform diagnostics and monitor live data and communication statistics.

Topics
- Overview of ControlWave Hardware
- Overview of OpenBSI Software Utilities
- Basic Troubleshooting
- Basic ControlWave Configuration

Audience
Field personnel whose responsibilities may include: installation, wiring, start-up, troubleshooting, configuration or maintenance of the ControlWave products. An individual who seeks a more thorough understanding of the ControlWave products.

Prerequisites
Participants must be thoroughly familiar with Windows 2000/ XP or later versions. Participants should have formal instrument technician training and a working knowledge of their application/process.

Overview
This 4-1/2-day virtual course covers programming the ControlWave product family using the ControlWave Designer IEC61131-3 software and the Designer function block library. This course will provide the participant the necessary knowledge and skills required to define and control inputs and outputs of related real-world applications. Participants will generate and debug simple control strategy programs using Function Block, Ladder Logic, Structured Text, and Sequential Function Chart programming. They will also learn the basics of ControlWave communications, historical data storage, alarming, hardware configurations and much more.

Topics
- Ladder Logic
- Structured Text
- Function Block Diagram
- Creating User Function Blocks

Audience
Personnel responsible for programming and debugging in ControlWave Designer programming software.

Prerequisites
Participants must have a strong working knowledge of personal computers and Windows XP or a later version. Participants should have a strong working knowledge of their application/process.
### Remote Automation Solutions - ControlWave - Designer Programming Short Course - RA440

**CEUs - 1.8**

**Overview**
A hands-on course that will give you as much exposure to ControlWave programming as possible in the shortest amount of time. The ControlWave Designer short 2 ½ day course provides the knowledge and skill required to define and control inputs and outputs of related real-world applications, including basic communications and troubleshooting. The class project will help students generate and debug simple control strategy programs using Function Block, Ladder Logic, and Structured Text programming languages, including programming for Modbus communications.

**Topics**
- Understand How IEC-61131-3, ControlWave Designer and On-Line Utilities Work
- Master Skills Necessary to Create a Program for ControlWave Controllers
- Learn the Bristol Library of Function Blocks for Measurement, Calculations, Process Control, Data Storage
- Understand OpenBSI Communications Software
- Master How to Establish Ethernet/IP Communications using ControlWave Designer
- Learn to Program Polling and Data Transfers in BSAP and an I/O Environment
- Understand How to Define a Hierarchical Network of ControlWave Controllers using NetView
- Understand the Configuration of Communication via other Protocols such as Modbus

**Prerequisites**
Participants must have a strong working knowledge of personal computers and Windows XP or a later version. Participants should have a strong working knowledge of their application/process. Participants should have programming experience (this course is not recommended for beginner programmers).

### Remote Automation Solutions - ControlWave - Designer Programming Short Course - RA440V

**CEUs - 1.8**

**Overview**
A virtual course that will give you as much exposure to ControlWave programming as possible in the shortest amount of time. The ControlWave Designer short 2 ½ day course provides the knowledge and skill required to define and control inputs and outputs of related real-world applications, including basic communications and troubleshooting. The class project will help students generate and debug simple control strategy programs using Function Block, Ladder Logic, and Structured Text programming languages, including programming for Modbus communications.

**Topics**
- Understand How IEC-61131-3, ControlWave Designer and On-Line Utilities Work
- Master Skills Necessary to Create a Program for ControlWave Controllers
- Learn the Bristol Library of Function Blocks for Measurement, Calculations, Process Control, Data Storage
- Understand OpenBSI Communications Software
- Master How to Establish Ethernet/IP Communications using ControlWave Designer
- Learn to Program Polling and Data Transfers in BSAP and an I/O Environment
- Understand How to Define a Hierarchical Network of ControlWave Controllers using NetView
- Understand the Configuration of Communication via other Protocols such as Modbus

**Prerequisites**
Participants should have:
- Completed course RA441 or have sufficient programming experience in ControlWave Designer.
- A strong working knowledge of personal computers and Windows XP or a later version.
- A strong working knowledge of their application/process.

### Remote Automation Solutions - ControlWave - Modbus Programming for ControlWave Devices - Virtual - RA444V

**CEUs - 0.4**

**Overview**
This 4-hour Virtual Course provides the knowledge and skill required to programming for Modbus communications in ControlWave Devices. Each student will be provided remote access to a PC (ControlWave Designer installed), and connection to ControlWave device for programming and downloading capability.

**Audience**
This course is for engineers, technicians, and others involved with programming the ControlWave for Modbus communications.

**Prerequisites**
Participants should have:
- Completed course RA441 or have sufficient programming experience in ControlWave Designer.
- A strong working knowledge of personal computers and Windows XP or a later version.
- A strong working knowledge of their application/process.
Remote Automation Solutions -
CONTROLWAVE® - Designer Programming - Accelerated - RA443 CEUs - 3.2

Overview
Save time and money by attending this fast-paced, hands-on course for programming the ControlWave® product family using IEC-61131-3 standard software and Bristol®-supplied functions. This course provides you with the knowledge and skills required to define and control inputs and outputs of related real-world applications, including communications and troubleshooting. Students will generate and debug control strategy programs using several programming languages while learning the basics of ControlWave network communications, historical data storage, alarming, and hardware configurations, including MODBUS communications.

Topics
- Flash Memory Communication Configuration via Local View
- Ladder Logic
- Function Block Diagram
- Debugging Techniques
- Programming for Audits/Archives/Alarms
- Establishing User Libraries

Audience
Personnel responsible for the establishment of communication interfaces to ControlWave Automation products

Prerequisites
- Participants must have a strong working knowledge of personal computers and Windows 2000/ XP or a later version
- Participants must have a strong working knowledge of their application/ process
- Participants should have some programming experience.
- Participants should have completed “Creating a Simple Project”.

Remote Automation Solutions -
ControlWave® - Gas Measurement Products - RA445 CEUs - 1.8

Overview
The ControlWave Gas Measurement 2-1/2-day course provides participants with a thorough understanding of configuring the ControlWave® GFC, EFM, and XFC Flow Computers for single or multiple-run gas measurement. As a hands-on course, students will use TechView to collect historical logs, calibrate internal and external pressure sensors, and gain troubleshooting techniques for real world applications.

Topics
- Hardware Configuration
- TechView Software Overview
- Log Collection
- Troubleshooting
- Configuring 4-Run Gas Application

Audience
Personnel responsible for the installation, wiring, start-up, configuration and maintenance of ControlWave gas flow computers

Prerequisites
The following are suggested, not mandatory:
- Participants should have a working knowledge of their application/process
- Participants should be familiar with Windows 2000/ XP or later versions and possess a general knowledge of gas measurement and production

Remote Automation Solutions -
ControlWave® - Station Manager Configuration - RA447 CEUs - 1.8

Overview
The Gas Measurement Applications for technicians 2 ½ day course provides students with a thorough understanding of configuration of the Station Manager application for the ControlWave Micro. Participants will use TechView to configure the ControlWave Micro application to establish multiple gas measurement and control scenarios, historical log collections, calibrations, and much more.

Topics
- Hardware Overview
- Writing/Saving Configurations
- I/O Controls
- MVT Calibration
- Station Configuration

Audience
Personnel responsible for the installation, wiring, start-up, configuration and maintenance of ControlWave gas flow computers

Prerequisites
The following are suggested, not mandatory:
- Participants should have a working knowledge of their application/process.
- Participants should be familiar with Windows XP or later versions and possess a general knowledge of gas measurement and production.
Overview
The Gas Measurement Applications for technicians 2 ½ day course provides students with a thorough understanding of configuration of the Station Manager application for the ControlWave Micro. Participants will use TechView to configure the ControlWave Micro application to establish multiple gas measurement and control scenarios, historical log collections, calibrations, and much more.

Topics
- Hardware Overview
- Writing/Saving Configurations
- I/O Controls
- MVT Calibration
- Station Configuration

Audience
Personnel responsible for the installation, wiring, start-up, configuration and maintenance of ControlWave gas flow computers

Prerequisites
The following are suggested, not mandatory:
- Participants should have a working knowledge of their application/process.
- Participants should be familiar with Windows XP or later versions and poses a general knowledge of gas measurement and production.

Overview
This 4-1/2-day course is a continuation of ControlWave® Designer Fundamentals course focusing on networking and communications. Participants will program the ControlWave to communicate to other devices in a network, as well as transfer and receive signal lists using serial and IP communications. Other application software will be utilized to configure, establish, and debug communications with these devices. Participants will learn the advanced methods of communicating to Bristol and ControlWave devices using Client/Server modules, and to Modbus protocol devices using custom function blocks.

Topics
- Client/Server Function Blocks
- Modbus Programming
- System Communication Variables
- BSAP Network Communications

Audience
Personnel responsible for the establishing of communication interfaces to ControlWave Automation products

Prerequisites
Successful completion of course RA441, ControlWave Designer Fundamentals. Participants must have a strong working knowledge of personal computers and Windows XP or later version. Participants should have a strong working knowledge of their application/process.
Remote Automation Solutions - ControlWave® Designer Programming - Accelerated - RA443V  
CEUs - 4.5

Overview
Save time and money by attending this fast-paced, virtual course for programming the ControlWave® product family using IEC-61131-3 standard software and Bristol-supplied functions. This course provides you with the knowledge and skills required to define and control inputs and outputs of related real world applications, including communications and troubleshooting. Students will generate and debug control strategy programs using several programming languages while learning basics of CONTROLWAVE® network communications, historical data storage, alarming and hardware configurations, including MODBUS communications.

Topics
- Flash Memory Communication Configuration via Local View
- Ladder Logic
- Function Block Diagram
- Debugging Techniques
- Programming for Audits/Archives/Alarms
- Establishing User Libraries

Audience
Personnel responsible for the establishing of communication interfaces to ControlWave products.

Prerequisites
Participants must have strong working knowledge of personal computers and Windows 2000/XP or a later version. Participants must have a strong working knowledge of their application/process. Participants should have some programming experience.

Remote Automation Solutions - Creating Your Own Function Block Using ControlWave Designer - RA446V  
CEUs - 0.4

Overview
This 4-hour virtual course provides the knowledge and skill required to create your own Function Block from existing Function Blocks using Controlwave Designer software to test and trouble shoot the final project. Each student will be provided remote access to a PC (ControlWave Designer installed).

Audience
This course is for engineers, technicians and others involved with programming ControlWave.

Prerequisites
Participants should have completed courses RA440 and RA441 or have sufficient programming experience in ControlWave Designer. Participants should have a strong working knowledge of personal computers and Windows 7 or a later version. Participants should have a strong working knowledge of their application/process.

Remote Automation Solutions - FloBoss™ - Configuration and Operations - RA1220  
CEUs - 3.2

Overview
This 4-1/2-day course will provide an overall working knowledge of the FloBoss™ 103, FloBoss 107. Participants are presented with a comprehensive view of the FloBoss 103/107 hardware and ROCLINK800 software to obtain the necessary knowledge needed to effectively install, configure and maintain the FloBoss 103/107 products. Each student will be provided with a PC (ROCLINK800 preinstalled), a FloBoss 107RTU, a communications cable and a workbook for the duration of the class. However, participants are encouraged to bring their laptop to class.

Topics
- Flow Measurement Review
- FloBoss™ 103/107 Hardware Overview
- FloBoss
  - Check and Set ROC Information
  - Check and Set ROC System Flags
  - Communication Basics
  - Elements of a Basic Configuration
  - Configuring I/O Points
  - Calibrating AI and AO Points
  - Overview of MVS Products
  - Setup of Multi-dropping of MVS
  - Configuring AGA Flow Calculations
  - Configuring FloBoss History
  - Modbus Tables
  - PID Configuration
  - Building FloBoss Displays
  - FST Workshop

Audience
This Remote Automation Solutions course is for engineers, technicians and others involved with the configuration and operation of the FloBoss™ 103 and 107 products.

Prerequisites
Participants should have a working knowledge of their application/process and should also have advanced PC knowledge and be thoroughly familiar with Microsoft Windows operating systems (XP or later versions).
Overview
This 4-hour Virtual Course will provide an overall working knowledge of configuring the ROC800 and FloBoss™ Series for Modbus communications. Each student will be provided remote access to a PC (ROCLINK preinstalled), and a Remote Automation Solutions RTU device.

Topics
- Configuration for Modbus Slave
- Configuration for Modbus Master
- Modbus Serial IP
- Basic Modbus Troubleshooting

Audience
This course is for engineers, technicians, and others interested in understanding the configuration and operation of the ROC800 using the SmartProcess Oil and Gas Applications.

Prerequisites
Completed course RA1220 or RA1240 or have sufficient working knowledge of configuring the ROC800 or FloBoss™. Basic PC knowledge and familiar with Microsoft Windows operating systems (XP or later version).

Overview
The 2-day FloBoss™ S600+ Fundamentals course will have participants become familiar with the FloBoss S600+ hardware, the startup menu, fundamental features of the S600+ applications. Be able to operate FloBoss S600+ front panel and web-server. Be able to download and upload configurations. Be able to edit S600+ configuration files using PC Setup, Report Editor, Modbus Editor and Display Editor. The FloBoss S600+ Fundamentals course provides an overview into the hardware and operational aspects of the FloBoss S600+ flow computer.

Topics
- Introduction to S600+
- Standard Application Overview
- S600+ Hardware Overview
- Navigating Displays
- Editing Display Items
- Editing Configurations with Config600
- Using Config600 Transfer

Prerequisites
Participants should be familiar with metering techniques and standards. Participants should bring their own laptop computers to the course and must have administrator privileges. Participants must be PC literate.

Overview
The 2-1/2-day advanced course provides an insight into the generation of application configurations for the FloBoss™ S600+.

Topics
- Loading Config600 Pro Software License
- Firmware Versions
- Using System Editor Object Types
- Logical cEditor
- Registering Tickets - Do's and Don'ts

Audience
This FloBoss™ S600+ Advanced Course is aimed at application engineers and system integrators who design and develop FloBoss S600+ applications for integration with metering systems and skids.

Prerequisites
Participants should be familiar with metering techniques and standards. Participants should bring their own personal computer to the course and should have administrative privileges. Participants must be PC literate. Participants must have attended the RA900.
Overview
The 2½-day advanced virtual course provides an insight into the generation of application configurations for the FloBoss™ S600+.

Topics
- Loading Config600 Pro Software License
- Firmware Versions
- Using System Editor Object Types
- Logical Editor
- Registering Tickets - Do's and Don'ts

Audience
This FloBoss™ S600+ Advanced Course is aimed at application engineers and system integrators who design and develop FloBoss S600+ applications for integration with metering systems and skids.

Prerequisites
Participants should be familiar with metering techniques and standards. Participants should bring their own personal computer to the course and should have administrative privileges. Participants must be PC literate. Participants must have attended the RA900.

Overview
The 2-day FloBoss™ S600+ Fundamentals course will have participants become familiar with the FloBoss S600+ hardware, the startup menu, fundamental features of the S600+ applications. Be able to operate FloBoss S600+ front panel and web-server. Be able to download and upload configurations. Be able to edit S600+ configuration files using PC Setup, Report Editor, Modbus Editor and Display Editor. The FloBoss S600+ Fundamentals course provides an overview into the hardware and operational aspects of the FloBoss S600+ flow computer.

Topics
- Introduction to S600+
- Standard Application Overview
- S600+ Hardware Overview
- Navigating Displays
- Editing Display Items
- Editing Configurations with Config600
- Using Config600 Transfer

Prerequisites
Participants should be familiar with metering techniques and standards. Participants should bring their own laptop computers to the course and should preferably have administrator privileges. Participants must be PC literate.

Overview
The 4½-day course will provide participants hardware knowledge of the S600+. How to navigate the keypad display and be able to create and edit S600+ configurations using Config600 software. The FloBoss™ S600+ Combined Course is a combination of both the fundamentals course and the advanced course in one.

Topics
- Standard Application Overview S600+
- Hardware Overview Navigating Displays
- Editing Display Items
- Editing Configurations with Config600 Using
- Config600 Transfer
- Loading Config600 Pro Software License
- Firmware Versions
- Using System Editor Object Types
- Logical Editor
- Registering Tickets - Do's and Don'ts

Prerequisites
Participants should be familiar with metering techniques and standards. Participants should bring their own laptop computers to the course and should have administrative privileges. Participants must be PC literate.
### Remote Automation Solutions - FloBoss™ Configuration and Operations - Virtual - RA1220V

**CEUs - 3.0**

**Overview**

This 2-1/2-day virtual course will provide an overall working knowledge of the FloBoss™ 103, FloBoss 107. Participants are presented with a comprehensive view of the FloBoss 103/107 hardware and ROCLINK800 software to obtain the necessary knowledge needed to effectively install, configure and maintain the FloBoss 103/107 products. Each student will be provided access to a PC (ROCLINK800 preinstalled), a FloBoss 107RTU, a communications cable and a workbook for the duration of the class.

**Topics**
- Flow Measurement Review
- FloBoss™ 103/107 Hardware Overview
- FloBoss
  - Check and Set ROC Information
  - Check and Set ROC System Flags
  - Communication Basics
  - Elements of a Basic Configuration
  - Configuring I/O Points
  - Calibrating AI and AO Points
  - Overview of MVS Products
  - Setup of Multi-dropping of MVS
  - Configuring AGA Flow Calculations
  - Configuring FloBoss™ History
  - Modbus Tables
  - PID Configuration
  - Building FloBoss Displays
  - FST Workshop

**Audience**

This Remote Automation Solutions course is for engineers, technicians and others involved with the configuration and operation of the FloBoss™ 103 and FloBoss 107 products.

**Prerequisites**

Participants should have a working knowledge of their application/process and should also have advanced PC knowledge and be thoroughly familiar with Microsoft Windows operating systems (XP or later versions).

### Remote Automation Solutions - Introduction to ControlWave Programming - Virtual - RA1140V

**CEU – 0.2**

**Overview**

This FREE 2-hour short course utilizes the Virtual Classroom to provide basic programming steps in programming the ControlWave device using Ladder Logic and Function Block languages.

**Topics**
- How Virtual Learning works
- Programming in Ladder Logic
- Compiling and downloading application project
- Using Stimulation Mode
- Inserting a Function Block

**Audience**

All personnel interested in a brief overview of programming ControlWave devices.

**Prerequisites**

None

### Remote Automation Solutions - ROCLink Configuration - Introduction - Virtual - RA1141V

**CEU – 0.2**

**Overview**

This FREE 2-hour demo provides a brief overview of the Virtual Classroom. In this demonstration, you will learn what the Virtual Classroom is and how it works. Learn some basics of configuring of the ROC800 or FloBoss.

**Topics**
- What is virtual training
- What is required
- Hands-on exercises
- Basic Configurations of the ROC800 or FloBoss

**Audience**

All personnel whose responsibilities may include: configuring, start-up, troubleshooting, of maintenance of the ROC800 or FloBoss.

**Prerequisites**

None

### Remote Automation Solutions - Marine Terminal Management - Basics - RA504V

**CEU – 1.4**

**Overview**

This 2-day virtual course helps participants understand the overall terminal process, the basic Terminal Manager software system, and how it works. Additional topics include understanding the elements a of terminal, Terminal Manager Architectures, system configuration, and more.

**Topics**
- Discussion of Terminal Manger systems
- Elements of a Terminal
- Applications for Terminal Manager
- What is ISA-95 and how Terminal Manager works
- Terminal Manager Hardware
- Communication Protocols

**Day 1**
- Terminal Manager Architectures
- Software Overview
- Post Installation Setup
- System Setup
- System Configuration

**Audience**

The class is intended for users who have experience with programming and configuration of Remote Automation Solutions RTU’s in terminal storage arena.

**Prerequisites**
- Participants must have a strong working knowledge of personal computers and Windows 7 or a later version
- Participants must have a strong working knowledge of their application/process
- Participants should have a strong working knowledge of Remote Automation Solutions RTU’s
Remote Automation Solutions -
OpenEnterprise - SCADA Systems -
Accelerated Ver. 2.8x - RA703
CEU – 3.2

Overview
This 4½ day course provides an accelerated approach to learning about the
OpenEnterprise 2.8x SCADA System. At the conclusion of the class, students will be
able to install a very simple OpenEnterprise Server and Workstation, configure
communications with Remote Automation Solutions' RTU's, build basic HMI displays,
configure trends and alarm windows, collect historical data, perform basic SQL queries,
and develop a basic user interface using these products.

Topics
- Basic Concepts
- Product Architecture
- Database Explorer
- Database Structure
- Display Building
- Aliasing
- History
- SQL Queries
- OE Desktop
- Alarm Priorities
- Security

Audience
The class is intended for users who will install, configure and design a basic
OpenEnterprise SCADA system.

Prerequisites
- Participants must have a strong working knowledge of personal computers and Windows XP or a later version
- Participants must have a strong working knowledge of their application/process
- Participants should have a strong working knowledge of OpenBSI and ControlWave Designer and ROC Configuration

Remote Automation Solutions -
FloBoss™ S600+ Fundamentals and
Advanced - RA902V
CEUs - 3.2

Overview
The 4-1/2-day course will provide participants hardware knowledge of the
S600+. How to navigate the keypad display and be able to create and edit S600+
configurations using Config600 software. The FloBoss™ 600+ Combined Course is a
combination of both the fundamentals course and the advanced course in one.

Topics
- Standard Application Overview S600+
- Hardware Overview Navigating Displays
- Editing Display Items
- Editing Configurations with Config600 Using
- Config600 Transfer
- Loading Config600 Pro Software License
- Firmware Versions
- Using System Editor Object Types
- Logical cEditor
- Registering Tickets - Do's and Don'ts

Audience
The course is intended for users who have experience with programming and
configuration of Remote Automation Solutions RTUs.

Prerequisites
- Participants should have formal RTU configuration training and a working knowledge of their application/process.
- Participants must have completed course RA801 Basic OpenEnterprise Course version 3.x.

Remote Automation Solutions -
OpenEnterprise - SCADA Systems Ver.
3.x - Intermediate - RA802
CEUs - 3.2

Overview
This 4½ day course will equip the participant to be able to; configure
the communications, security, historical, alarming, asset modeling and other major
subsystems of an OpenEnterprise and Workstation (version 3.x). Most of the tools
within the OpenEnterprise Administrative Tools will be covered during this class.

Topics
- Configure Security
- Historical Collections
- Alarming
- Asset Modeling
- Work Flows
- Local Signals and Alarms
- Administrative Tools

Audience
The course is intended for users who have experience with programming and
configuration of Remote Automation Solutions RTUs.

Prerequisites
- Participants should have formal RTU configuration training and a working knowledge of their application/process.
- Participants must be thoroughly familiar with Windows 7. Participants should have advanced PC and networking skills.
- Participants must have completed course RA801 Basic OpenEnterprise Course version 3.x.
Overview
This 2 ½ day virtual course addresses these new subsystems and improvements which were added to the previous 2.8x OpenEnterprise Server system. These enhancements are on a Windows 7 platform and will enable you to install an OpenEnterprise Server/Workstation and configure and perform various Server/Workstation functions. These functions include the ease of adding devices to the system, configuring database calculations, work flows, asset modeling, communicating to Modbus devices and more.

Topics
- Calculations
- Work Flows
- Administrative Tools
- MODBUS Data Collection
- Database Asset Modeling

Audience
This class is intended for engineers who have OpenEnterprise systems, version 2.8x transitioning to version 3.x.

Prerequisite
Participants should have formal RTU configuration training and a working knowledge of their application/process. Participants must be thoroughly familiar with Windows 7. Participants should have advanced PC and networking skills. Participants must have completed course RA701 Basic and RA702 Intermediate Courses version 2.8x.

Overview
This 4-1/2-day course provides a very brief introduction to the OpenEnterprise Server, and more detailed coverage of the OpenEnterprise Workstation and OpenEnterprise Reporting packages (version 2.8X). At the conclusion of the class, students will be able to install a very simple OpenEnterprise Server and Workstation; configure communications with ControlWaves RTU’s and then begin building HMI displays, trends, alarm windows, and develop a basic user interface using these products.

Topics
- Database Explorer and Structure
- Creating Display Objects
- Alarm Windows, Alarm & Event History
- Creating and Configuring Trends
- Data Export
- Creating Reports
- System Troubleshooting

Audience
This class is intended for users who have experience with programming and configuration of Remote Automation Solutions RTUs.

Prerequisites
Participants should have formal RTU configuration training and a working knowledge of their application/process. Participants must be thoroughly familiar with Windows XP or later versions. Participants should have advanced PC and networking skills. Participants must have completed the Basic OpenEnterprise Class course RA701.
## Remote Automation Solutions - OpenEnterprise - SCADA Systems Ver. 3.x - Basics - RA801

### CEUs - 3.2

### Overview
This 4-1/2-day course provides a very brief introduction to the OpenEnterprise Server, and more detailed coverage of the OpenEnterprise Workstation and OpenEnterprise Reporting packages (version 3.x). At the conclusion of the class, students will be able to install a simple OE Server and Workstation, configure communications with Remote Automation Solution’s RTU’s and then begin building HMI displays, trends, alarm windows, and develop a basic user interface using these products.

### Topics
- Database Structure
- Creating Display Objects
- Alarm Windows, Alarm & Event History
- Creating and Configuring Trends
- Data Export
- Creating Reports
- Calculation Server
- Communications Manager
- Data Collection
- Plant Area Grouping

### Audience
The class is intended for users who have experience with programming and configuration of Remote Automation Solutions RTUs.

### Prerequisites
Participants must have a strong working knowledge of personal computers and Windows 7. Participants must have a strong working knowledge of their application/process. Participants should have a strong working knowledge of Remote Automation Solutions RTUs.

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## Remote Automation Solutions - OpenEnterprise - SCADA Systems Ver. 3.x - Virtual - Basics- RA801V

### CEUs - 3.2

### Overview
This 4-1/2-day virtual course provides a very brief introduction to the OpenEnterprise Server, and more detailed coverage of the OpenEnterprise Workstation and OpenEnterprise Reporting packages (version 3.x). At the conclusion of the class, students will be able to install a simple OE Server and Workstation, configure communications with Remote Automation Solution’s RTU’s and then begin building HMI displays, trends, alarm windows, and develop a basic user interface using these products.

### Topics
- Database Structure
- Creating Display Objects
- Alarm Windows, Alarm & Event History
- Creating and Configuring Trends
- Data Export
- Creating Reports
- Calculation Server
- Communications Manager
- Data Collection
- Plant Area Grouping

### Audience
The class is intended for users who have experience with programming and configuration of Remote Automation Solutions RTUs.

### Prerequisites
Participants must have a strong working knowledge of personal computers and Windows 7. Participants must have a strong working knowledge of their application/process. Participants should have a strong working knowledge of Remote Automation Solutions RTUs.

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## Remote Automation Solutions - OpenEnterprise - SCADA Systems Ver. 3.x - Virtual - Intermediate - RA802V

### CEUs - 3.2

### Overview
This 1-1/2-day virtual course will equip the participant to be able to; configure the communications, security, historical, alarming, asset modeling and other major subsystems of an OpenEnterprise and Workstation (version 3.x). Most of the tools within the OpenEnterprise Administrative Tools will be covered during this class.

### Topics
- Configure Security
- Historical Collections
- Alarming
- Asset Modeling
- Work Flows
- Local Signals and Alarms
- Administrative Tools

### Audience
The course is intended for users who are responsible for installing and configuring the Open Enterprise system.

### Prerequisites
Participants should have formal RTU configuration training and a working knowledge of their application/process. Participants must be thoroughly familiar with Windows 7. Participants should have advanced PC and networking skills. Participants must have completed course RA801 Basic OpenEnterprise Course version 3.x.
Remote Automation Solutions - ROC - Configuration - ROC800L - RA1244
CEUs - 2.1

Overview
This 2-1/2-day course will provide an overall working knowledge of the ROC800L. Participants are presented with a comprehensive view of the ROC800L hardware and software to obtain the necessary knowledge and practice needed to install and configure a ROC800L. Participants will know the differences between the ROC809 and ROC800L. Each student will be provided with a PC (ROCLINK preinstalled), a Remote Automation Solutions RTU (ROC800L), a communications cable, and a workbook for the duration of the class. However, participants are encouraged to bring their laptop to class.

Topics
- Basic Concepts and Product features
- Install and configure a ROC800L RTU
- Convert ROC800 to RO800L
- Configuring an Application
- Updating Firmware and Software

Audience
This Remote Automation Solutions course is for engineers, technicians and others involved with the operation and maintenance of the ROC800L.

Prerequisites
Participants should have formal RTU training, preferably with ROC800 series products, ROCLINK800 software and a working knowledge of their application/process. Participants should have advanced PC knowledge and be thoroughly familiar with Microsoft Windows operating systems (XP or later versions).

Remote Automation Solutions - ROC - Configuration and Operations - ROC800 Series - RA1240
CEUs - 3.2

Overview
This 4-1/2-day course will provide an overall working knowledge of the ROC800 series RTU. Participants are presented with a comprehensive view of the ROC800 series hardware and ROCLINK800 software to obtain the necessary knowledge needed to effectively install, configure and maintain the ROC800 series products. Each student will be provided with a PC (ROCLINK800 preinstalled), a Remote Automation Solutions RTU, a communications cable and a workbook for the duration of the course. However, participants are encouraged to bring their laptop to class.

Topics
- Flow Measurement Review
- ROC800 Series Hardware Overview
- Introduction to ROCLINK800 Software
  - ROC800 Series Configuration
    - Check and Set ROC Information
    - Check and Set ROC System Flags
    - Communication Basics
    - Elements of a Basic Configuration
    - Configuring I/O Points
    - Calibrating AI and AO Points
    - Overview on MVS Product
    - Setup Multi-Dropping of MVS
    - Configuring AGA Flow Calculation
    - Configuring ROC History
    - Modbus Tables
    - PID Configuration
    - Building ROC Displays
    - FST Workshop
Overview
This 3-1/2-day virtual course will provide an overall working knowledge of the ROC800 series RTU. Participants are presented with a comprehensive view of the ROC800 series hardware and ROCLINK800 software to obtain the necessary knowledge needed to effectively install, configure and maintain the ROC800 series products. Each student will be provided with a PC (ROCLINK800 preinstalled), a Remote Automation Solutions RTU, a communications cable and a workbook for the duration of the course.

Topics
- Flow Measurement Review
- ROC800 Series Hardware Overview
- Introduction to ROCLINK800 Software
- ROC800 Series Configuration
- Check and Set ROC Information
- Check and Set ROC System Flags
- Communication Basics
- Elements of a Basic Configuration
- Configuring I/O Points
- Calibrating AI and AO Points
- Overview on MVS Product
- Setup Multi-Dropping of MVS
- Configuring AGA Flow Calculations
- Configuring ROC History
- Modbus Tables
- PID Configuration
- Building ROC Displays
- FST Workshop

Audience
This Remote Automation Solutions course is for engineers, technicians, and others involved with configuring the ROC800 products.

Prerequisites
Participants should have experience with ROC800 series hardware and ROCLINK800 software. A working knowledge of their application/process and should be thoroughly familiar with Microsoft Windows operating Systems (XP or later versions). Familiarity with IEC-61131 programming languages is not required, since it is covered in this course.
Overview
This 2-1/2-day course will provide an overall working knowledge of the DL8000 Preset System Controller. Participants will be enabled to configure, operate and diagnose the DL8000 Preset System Controller. Each student will be provided with a PC (ROCLINK preinstalled), a Remote Automation Solutions RTU (DL8000), a communications cable, and a workbook for the duration of the class.

Topics
- Basic Concepts and Product features of the DL8000
- Set Up Parameters
- Hardware diagnostics and Troubleshooting
- DL8000 Configuring Dynamic, Real-Time Display of Flow Parameters
- Configuring for Additive Injection
  - Temperature Compensation
  - Data Logging
  - Communications
- Blending Methods and Flow Sequencing

Audience
This Remote Automation Solutions course is for engineers, technicians, and others involved with the operation and maintenance of the DL8000 Preset System Controller product.

Prerequisites
Participants should have formal RTU configuration training preferably with ROC800 series hardware and a working knowledge of their application/process. Participants should have advanced PC knowledge and be thoroughly familiar with Microsoft Windows operating systems (2000/XP or later versions).

Overview
Production Manager (PM) Series: Overview and Surface Controls Manager for ROC and FloBoss™ Overview. This 1-day virtual training class will provide an overview of the Production Manager Series, the cornerstone of Emerson's SmartProcess Oil and Gas Applications. This class will focus on two of applications, Surface Controls Manager and Local Display Manager, utilized in conjunction with the balance of the applications. Some of the configuration activities will include: control logic, maintenance bypassing, and use of accumulators, advanced calculations configuration, user lists, and display navigation.

Topics
- Surface Controls Applications
- Local Display Manager

Audience
This course is for engineers, technicians, and others interested in understanding the configuration and operation of the ROC800 using the SmartProcess Oil and Gas Applications.

Prerequisites
Participants should have a strong working knowledge of personal computers and Windows XP or a later version.
Remote Automation Solutions - SmartProcess Production Applications Foundation Well Operations and Optimization - RA3014V
CEUs: 1.4

Overview
Production Manager (PM) Series: Well Optimization and Chemical Manager for ROC and FloBoss™ Overview This 2-day virtual training course will provide a combination of lecture and hands-on configuration activities related to production well operations, such as choke control, artificial lift techniques and chemical injection. Some configuration activities include: (1) modification & tuning of plunger and/or gas lift wells, and (2) application of advanced set point techniques and/or inhibit logic for optimized chemical injection. As time permits, an overview of Automated Choke controls will be covered.

Topics
- Well Optimization
- Configuration & Operations
- Gas Lift
- PAGL
- Cycle Logs
- Chemical Manager
- Chemical Configuration
- Injection Point Configuration

Audience
Course is for engineers, technicians, and others interested in understanding the configuration and operation of the ROC800 using the SmartProcess Oil & Gas Applications.

Prerequisites
Participants should have a strong working knowledge of personal computers and Windows XP or a later version. Participants should have completed course Surface Controls Manager RA3012V.

Remote Automation Solutions - Terminal Manager Operations - Basic Tier 1 - RA501V
CEUs: 1.4

Overview
This 2-day virtual course helps participants understand the overall terminal process, the basic Terminal Manager software system, and how it works. Additional topics include understanding the elements of terminal, Terminal Manager Architectures, system configuration, and more.

Topics
Day 1
- Discussion of Terminal Manager systems
- Elements of a Terminal
- Applications for Terminal Manager
- What is ISA-95 and how Terminal Manager works
- Terminal Manager Hardware
- Communication Protocols

Day 2
- Terminal Manager Architectures
- Software Overview
- Post Installation Setup
- System Setup
- System Configuration

Audience
The class is intended for users who have experience with programming and configuration of Remote Automation Solutions RTU’s in terminal storage arena.

Prerequisites
- Participants must have completed course RA501 Terminal Manager Basics and Operations
- A strong working knowledge of personal computers and Windows 7 or later
- Participants must have a strong working knowledge of their application/process

Remote Automation Solutions - Terminal Manager Business Management - Limited Tier 2 - RA502V
CEUs: 0.7

Overview
This 1-day virtual course helps participants understand the business components of the terminal process. This online customer order management process includes the execution of scheduling, delivery, and receipt of order. Other business entity topics include allocations of accounts, shippers, drivers and clients.

Topics
- Business Entity Configuration
- Order Management
- Allocations
- Inventory Management

Audience
The class is intended for users requiring the understanding of the business components of the terminal process.

Prerequisites
- Participants must have completed course RA501 Terminal Manager Basics and Operations
- A strong working knowledge of personal computers and Windows 7 or later
- Participants must have a strong working knowledge of their application/process
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Remote Automation Solutions - Terminal
Manager Business Management -
Advanced Tier 3 - RA503V
CEUs: 0.7

Overview
This 1-day course helps participants understand the advanced business components of the terminal process which includes aspects of invoicing, net receipts and inventory requests.

Topics
Net Receipts
• Invoicing
• Terminal Tank Inventory
• Tariff Requests
• Inventory Management
• Product Rebranding

Audience
The class is intended for users requiring the understanding of the business components of the terminal process.

Prerequisites
• Participants must have completed course RA501 Terminal Manager Basics and Operations and RA502 Terminal Manager Business Management (Limited)
• A strong working knowledge of personal computers and Windows 7 or later
• Participants must have a strong working knowledge of their application/process

Remote Automation Solutions - ROC800
Operations and Configuration - Basic -
RA1260
CEUs: 1.4

Overview
This 2-day course will provide a basic overview of the ROC800 Controller. (Contact Educational Services for special discounting when enrolling in both course RA1260 Operation and Configurations Basic and course RA1261 Advanced Configurations at 1-800-338-8158). Participants are presented with a comprehensive view of the ROC800 hardware and software to obtain the necessary knowledge needed to configure, calibrate and view live data. PC's will be provided along with necessary hardware and courseware for the duration of the class but each participant is encouraged to bring their own PC.

Topics
Day 1
• Introduction
• Overview of ROC
• Wiring CPU and I/O Cards
• ROCLINK 800 Configuration Software Overview
• Elements of Basic Configuration
• Configuring Field I/O
• Firmware updates
• Configuring from Factory Defaults

Day 2
• Alarm and Events Logs
• Saving and Restoring Configurations
• Configuring Station and Runs for (AGA3 and AGA7) Flow Calculations
• Configuring Communications
• Calibrating the AI and AO module
• Configuring Historical Database

Audience
This Remote Automation Solutions course is for engineers, technicians, and others involved with the configuration and operation of the ROC800.

Prerequisites
Participants should have a working knowledge of their application/process and should also have advanced PC knowledge and be thoroughly familiar with Microsoft Windows operating systems (XP or later versions).

Remote Automation Solutions - ROC800
Operations and Configuration - Basic -
RA803V
CEUs: 1.4

Overview
This 2-day course provides a common approach to OpenEnterprise SCADA troubleshooting. At the conclusion of the class, students will be equipped with a practical guide to solving basic problems regarding OE Server and Workstation, RTU configurations, communications, alarms and more.

Topics
At the conclusion of the class, students will be equipped with a practical guide to solving basic problems regarding OE Server and Workstation, RTU configurations, communications, alarms and more.

Day 1
• Troubleshooting Common Database Problems
• Troubleshooting Common ControlWave Problems
• Communications
• Project / FCP Concerns
• Alarms
• History
• Database Updating
• Troubleshooting Common ROC/FloBoss Problems
• Communications
• TLP Concerns
• Alarms
• History
• Database Updating

Day 2
• Common Troubleshooting Graphworx Display Aids
• Troubleshooting Common License Concerns
• Troubleshooting Common Server/Workstation Problems
• Troubleshooting Basic History Reporting Problems for ROC and CW

Audience
The class is intended for users who have experience with OpenEnterprise 3.2.

Prerequisites
• Participants must have completed the RA801 OpenEnterprise for SCADA Systems Basics Course
• Participants must have a strong working knowledge of their application/process
Remote Automation Solutions - OpenEnterprise SCADA
Troubleshooting - Advanced - Virtual - RA804V
CEUs: 1.1

Overview
This 1 1/2-day course provides a common approach to OpenEnterprise SCADA advanced troubleshooting. At the conclusion of the class, students will be equipped with a practical guide to solving basic problems regarding OE Server and Workstation, RTU configurations, communications, alarms and more.

Topics
Day 1
- Troubleshooting Case 1 Archiving
- Troubleshooting Case 2 MODBUS
- Troubleshooting Case 3 Asset Modeling
- Troubleshooting Case 4 Backfilling a Trend
- Troubleshooting Case 5 Alarm Condition
- Database not starting problems

Audience
The class is intended for users who have experience with OpenEnterprise 3.2.

Prerequisites
- Participants must have completed the RA801 OpenEnterprise for SCADA Systems Basics Course and RA802 OpenEnterprise Intermediate.
- Participants must have a strong working knowledge of their application/process.

Remote Automation Solutions - ROC800
Troubleshooting and Configurations - Advanced - RA1261
CEUs: 1.8

Overview
This 2 ½ day course will help participants build upon the basic knowledge of configuring the ROC800 device. (Contact Educational Services for special discounting when enrolling in both course RA1260 Operation and Configurations Basic and course RA1261 Advanced Configurations at 1-800-338-8158). Participants will learn how to diagnose symptoms and troubleshoot common field problems, create FST’s, configure for Modbus communications to third part devices, and more. PC’s will be provided along with necessary hardware and courseware for the duration of the course. Each participant is encouraged to bring their own PC.

Topics
Day 1
- Configuring Station and Runs for (AGA3 and AGA7) Flow Calculations
- Saving and Restoring Configurations
- Configuring Historical Database
- Sampler Odorizer Control
- PID Configuration
- Radio Controls
- Troubleshooting

Day 2
- Setting up Modbus Tables
- Wireless HART
- Network Radio Communications
- FST Workshop
- Displays
- Troubleshooting

Day 3
- Troubleshooting

Audience
This Remote Automation Solutions course is for engineers, technicians, and others involved with the configuration and operation of the ROC800.

Prerequisites
Participants should have completed the ROC800 Basic course or have a comparable working knowledge of the ROC800 product. A good understanding of their application/process is helpful along with advanced PC knowledge, thoroughly familiar with Microsoft Windows operating systems (XP or later versions).
Overview
This 4-day course explains how pressure and temperature transmitters function and how they are installed and calibrated. It emphasizes installation, proper set-up and calibration of Analog and HART® Pressure and Temperature Transmitters. The course uses lectures and labs to teach the students. Those who complete this class will be able to:
- correctly perform installation and setup procedures
- properly configure transmitters
- properly calibrate transmitters
- perform basic troubleshooting

Topics
- Basic 4-20 mA Loop Setup
- Pressure Sensors
- Temperature Sensors (TC, RTD)
- Analog Transmitters (1151)
- HART® Communication
- Field Communicator
- Pressure Transmitters
- Temperature Transmitters
- Using AMS Device Manager to Configure and Calibrate Transmitters
- Installation
- Configuration
- Calibration
- Troubleshooting

Audience
This course is intended for technicians, engineers and other plant personnel who need to know installation, calibration, maintenance and troubleshooting of measurement instrumentation.

Prerequisites
Some experience in instrument calibration, maintenance, installation and operation would be helpful.

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Overview
This 2-day course explains how DP flow instruments function and how they are installed and calibrated. It emphasizes installation, proper set-up and calibration/verification of DP flow instruments. The course uses lectures and labs to teach the students. Those who complete this class will be able to:
- correctly install configure, calibrate multivariable DP Flow Transmitters
- perform DP Flow troubleshooting

Topics
- Basic DP Flow Fundamentals
- DP Flow Sizing Calculations
- Multivariable Flow Transmitters
- AMS Device Manager with Engineering Assistant Snap-ON (3095)
- Engineering Assistant for 3051SMV
- Field Communicator
- Test Equipment Selection
- Installation
- Configuration
- Calibration /Verification
- Troubleshooting DP Flow Installations

Audience
This course is intended for technicians, engineers and other plant personnel who need to know installation, calibration, verification, maintenance and troubleshooting of DP flow measurement instrumentation.

Prerequisites
Some experience in instrument calibration/verification, maintenance, installation and operation would be helpful.

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Overview
This 3-day course explains how level instruments function and how they are installed calibrated/verified. It emphasizes installation, proper setup and calibration/verification of level instruments. The course uses lectures and labs to teach the students. Those who complete this class will be able to:
- correctly install, configure, calibrate/verify, perform maintenance and troubleshooting on the following:
  - DP Level Transmitters
  - Guided Wave Radar Transmitters
  - Non-contacting Radar Transmitters
  - Use Radar software for configuration and troubleshooting

Topics
- DP Level Fundamentals
- Electronic Remote Sensors
- Radar Applications
- Radar Instruments
- Radar PC Software
- Field Communicator
- Test Equipment Selection
- Installation
- Configuration
- Calibration /Verification
- Troubleshooting

Audience
This course is intended for technicians, engineers and other plant personnel who need to know installation, calibration, maintenance and troubleshooting of level measurement instrumentation.

Prerequisites
Experience in instrument calibration, maintenance, installation and operation would be helpful.
**Rosemount - Fieldbus Measurement Instruments – 2370**

**CEUs - 2.1**

**Overview**
This 3-day class covers the integration of FOUNDATION™ fieldbus compliant measurement devices using the Field Communicator, Emerson USB Fieldbus Modem, AMS Device Manager, and other hosts.

Upon completion of this course students will be able to: install, configure, calibrate, and troubleshoot Rosemount Fieldbus devices which include the 3051C and 3051S Pressure Transmitters, 644, 3144P and 848 Temperature Transmitters 5600, 5400 and 5300 Radar Level Transmitters, and 752 Indicator.

**Topics**
- FOUNDATION™ fieldbus Overview
- Fieldbus: Wiring/Segment Design/Function Blocks
- Field Communicator Operation
- AMS Device Manager Operation
- Theory of Operation, Installation, Configuration, Maintenance, Calibration and Troubleshooting on the following:
  - 3051C Pressure Transmitter
  - 3051S Pressure Transmitter
  - 3144P, and 644 Temperature Transmitters
  - 848 Temperature Transmitter
  - 5600, 5400 and 5300 Radar Level Transmitters
  - 752 Fieldbus Indicator

Note: Course may be conducted using other Fieldbus Hosts, such as AMS Device Manager.

**Audience**
This course is for individuals responsible for installing, configuring, calibrating, and troubleshooting FOUNDATION™ fieldbus measurement devices.

**Prerequisites**
Experience in instrument calibration, maintenance, installation, and operation would be helpful.

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**CEUs - 2.1**

**Overview**
This 3-day course explains the measurement technology for Pressure, Temperature, Flow and Level instruments. It will also emphasis proper installation of these instruments.

**Topics**
- 4-20 mA Electrical Loops
- Pressure Sensors
- Pressure Instruments
- Temperature Sensors
- Temperature Instruments
- Analog Transmitters
- Smart Transmitters
- HART® Communication Protocol
- Field Communicator
- DP Flow
- Flow Technology Overview
- DP Level
- Electronic Remote Sensors
- Guided Wave Radar Level Instruments
- Non-Contacting Radar Level Instruments
- Self-Organizing Wireless Networks

**Audience**
This course is intended for engineers and other persons responsible for proper gas measurement for Pressure, Temperature, Level, and Flow.

**Prerequisites**
Students should have experience with process instrumentation and measurements.

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**Rosemount – Millennium II Gas Detector Transmitter – 2350**

**CEUs – 0.7**

**Overview**
This 1-day course covers Gas Detection measurement principles and theory of operation. The class will discuss the installation, configuration, operation, calibration, maintenance and troubleshooting of the Rosemount Millennium II Gas Detectors.

On completion students will know how to properly install, wire, configure, test with appropriate gases, and basic troubleshooting.

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**Rosemount – Instrument Fundamentals – Virtual – 2320V**

**Overview**
This 8-hour course introduces the common technologies, basic components, performance considerations and technology selection for pressure, temperature, level, flow and communication.

**Topics**
- Pressure
- Temperature
- Level
- Flow
- Communication

**Audience**
Instrument Technicians

**Prerequisites**
None
Rosemount - Pressure, Temperature & MultiVariable™ Flow Transmitters – 2329
CEUs - 1.4

Overview
This 2-day course uses lectures and labs to maximize the hands on experiences and teach the student how to install, configure, calibrate, troubleshoot, and maintain the Rosemount 3051, 3144P, and 3051SMV Transmitters.

Topics
- Field Communicator Operation
- 3051 Pressure Transmitter Installation, Configuration, Calibration and Troubleshooting
- 3144P Temperature Transmitter Installation, Configuration, Calibration and Troubleshooting
- 3051SMV Multivariable DP Flow Transmitter Installation, Configuration, Calibration and Troubleshooting

Note: Students must attend both days. Reference course, 2305, 2321 and 2308MV for further details.

Prerequisites
Students should have experience with process instrumentation and measurements.

Rosemount - Process Fundamentals for Measurement Technologies – c2323

Overview
Learn about the basics of process fundamentals across measurement technologies. This curriculum will give an introduction into the following categories: Amperometric, Combustion, Communication Protocols, Conductivity, Flow, Level, pH, Pressure, Temperature.

Topics
- Field Communicator Operation
- 3051 Pressure Transmitter Installation, Configuration, Calibration and Troubleshooting

Note: Product is also part of course 2370.

Prerequisite - None

Rosemount – 975 Flame Detector Transmitter – 2351
CEUs - 0.7

Overview
This 1-day course covers Flame Detection measurement principles and theory of operation. The class will discuss the installation, configuration, operation, calibration, maintenance and troubleshooting of the Rosemount 975 Flame Detectors.

Topics
- Optical sensors technology: UV, UV/IR, Multi IR
- Fuel types
- System design considerations
- Proper wiring: terminals, 4-20mA current output
- Optical path components
- Configuration using: 475 Field Communicator, Winhost software
- Testing with flame simulator
- Optics maintenance

Prerequisite
None

Rosemount - 3051 Pressure Transmitter – 2305 – Continued...

Audience
This course is designed for those individuals responsible for the installation and maintenance of the Rosemount 3051 Pressure Transmitter.

Prerequisites
Knowledge of basic pressure fundamentals and pressure instrumentation.

Rosemount - 3051 Fieldbus Pressure Transmitter – 2307
CEUs - 0.7

Overview
This 1-day course uses lectures and labs to maximize the hands on experiences and teach the student how to install, configure, calibrate and maintain the Rosemount 3051 Fieldbus Pressure Transmitter. The student will also learn the operation of the Field Communicator. Students who complete this course will be able to:
- identify 3051 parts and functionality
- explain the principles of operation of the 3051
- design and build a Fieldbus segment
- configure, test, and calibrate the 3051 Fieldbus Pressure Transmitters using the Field Communicator or AMS Device Manager
- properly install and troubleshoot the 3051 Fieldbus Transmitter

Topics
- 3051 Overview and Principles of Operation
- FOUNDATION™ Fieldbus Overview
- Fieldbus Wiring/Segment Design/Function Blocks
- Test Equipment Selection
- Bench Testing 3051 Fieldbus Transmitter
- Field Communicator Operation
- AMS Device Manager Operation
- Digital Trims/Calibration
- Installation and Start-Up
- Troubleshooting and Maintenance

Note: Product is also part of course 2370.

Audience
This course is designed for those individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount 3051 Fieldbus Pressure Transmitter.

Prerequisites
Knowledge of basic pressure fundamentals and pressure instrumentation.
Rosemount - 3051S Pressure Transmitter – 2308
CEUs - 0.7

Overview
This 1-day course uses lectures and labs to maximize the hands on experiences and teach the student how to install, configure, calibrate, troubleshoot, and maintain the Rosemount 3051S Pressure Transmitter. The student will also learn the operation of the Field Communicator or AMS Device Manager. Students who complete this course will be able to:

- identify 3051S parts and functionality
- explain the principles of operation of the 3051S
- configure and test the 3051S HA
- RT® Pressure Transmitters using the Field Communicator or AMS Device Manager
- properly install, configure, calibrate, and troubleshoot the 3051S HART transmitter

Topics
- 3051S Overview/Principles of Operation
- 3051S Installation and Options
- Test Equipment Selection
- Configure and Bench Testing the 3051S HART® Transmitter
- Configure and Test the 3051S Advanced Features:
  - Alarm & Saturation Levels, Alarm Direction, Write Protection
  - Process Alerts, Scaled Variable
- Digital Trims/Calibration
- Troubleshooting and Maintenance

Audience
This course is designed for those individuals responsible for the installation, configuration, calibration, troubleshooting, and maintenance of the Rosemount 3051S Pressure Transmitter.

Prerequisites
Knowledge of basic pressure fundamentals and pressure instrumentation.

Rosemount - 3051S MultiVariable™ Mass Flow Transmitter – 2310
CEUs - 0.7

Overview
This 1-day course uses lecture and labs to maximize the hands on experience and teach the student how to install, configure, calibrate and maintain the Rosemount Model 3051SMV HART® Mass Flow Transmitter. Students who complete this course will:

- identify transmitter parts and explain their functionality
- explain the principles of operation of the transmitter
- configure and test using the Field Communicator, AMS Device Manager, and the 3051SMV Engineering Assistant software
- configure the compensated flow parameters using the 3051SMV Engineering Assistant Software
- properly install & troubleshoot the 3051SMV transmitter

Topics
- DP Flow Fundamentals
- Overview and Principles of Operation
- Test Equipment Selection
- Temperature Sensor Wiring
- Bench Testing the Smart Transmitters
- 3051SMV Engineering Assistant Software
- Operation of the Field Communicator and AMS Device Manager
- Digital Trims/Calibration
- Installation and Start-Up
- Troubleshooting and Maintenance

Note: This product is also included in course 2327 and 2329.

Audience
This course is designed for those individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount 3051S Multi Variable (MV) Transmitter.

Prerequisites
Knowledge of basic Pressure, and DP Flow fundamentals and instrumentation.

Rosemount - 3095MV MultiVariable™ Transmitters – 2343
CEUs - 0.7

Overview
This 1-day course uses lecture and labs to teach the student how to install, configure, calibrate and maintain the Rosemount Model 3095MV Smart Transmitters. The student will also learn the operation of the Field Communicator. Students who complete this course will:

- identify transmitter parts and explain their functionality
- explain the principles of operation of the transmitter
- configure and test using the Field Communicator and the 3095MV Engineering Assistant (EA) Snap-On software
- configure the compensated flow parameters using AMS Device Manager with the 3095MV Engineering Assistant (EA) Snap-On Software
- properly install/troubleshoot transmitters

Topics
- DP Flow Fundamentals
- Overview and Principles of Operation
- Test Equipment Selection
- Temperature Sensor Wiring
- Bench Testing the Smart Transmitters
- AMS Device Manager with the 3095MV EA Snap-On Software
- Operation of the Field Communicator and AMS Device Manager
- Digital Trims/Calibration
- Installation and Start-Up
- Troubleshooting and Maintenance
- Configure/Wire/Setup the HART® Tri-Loop

Note: This product is also included in course 2343.

Audience
This course is designed for those individuals responsible for the installation and maintenance of the Rosemount 3095 Multi Variable (MV) Transmitter.

Prerequisites
Knowledge of basic pressure and temperature fundamentals/instrumentation.
### Rosemount - 4088 MultiVariable™ Transmitters – 2345 CEUs - 0.7

**Overview**
This 1-day course uses lecture and labs to maximize the hands on experience and teach the student how to install, configure, calibrate, and maintain the Rosemount 4088A MV Modbus Transmitters. The student will learn the operation and interface capabilities of the Rosemount Transmitter Interface Software (RTIS) and the Field Communicator. Students who complete this course will be able to:

- Explain the principles of operation of the transmitter
- Configure and test using the RTIS software and the Field Communicator
- Properly install, calibrate and troubleshoot the Transmitters
- Properly configure the transmitters Modbus parameters

**Topics**
- Flow Fundamentals
- Overview and Principles of Operation
- Bench Testing the Modbus Transmitter
- RTIS Software Operation
- Sensor Trims
- Installation and Startup
- Troubleshooting and Maintenance Modbus Configuration

### Rosemount - 3144P Temperature Transmitter – 2321 CEUs - 0.7

**Overview**
This 1-day course uses lecture and labs to teach the student how to install, configure, calibrate and maintain the Rosemount 3144P HART® Temperature Transmitters. The student will also learn the operation of the Field Communicator. Students who complete this course will:

- identify 3144P parts and explain their functionality
- explain the principles of operation of the 3144P
- configure, calibrate and test 3144P HART® Temperature Transmitters using the Field Communicator or AMS Device Manager
- properly install and troubleshoot the 3144P Temperature Transmitters

**Topics**
- 3144P Overview and Principles of Operation
- Test Equipment Selection
- Sensor Selection and Wiring
- Bench Testing the 3144P HART® Transmitters
- Smart Transmitters
- Field Communicator Operation
- AMS Device Manager Operation
- Digital Trims/Calibration
- 3144P Dual Sensor Setup
- Configuration
- Installation and Start-Up
- Troubleshooting and Maintenance

**Note:** This course can also be taught using the Rosemount 644. This product is also included in courses 2326 and 2329.

**Audience**
This course is designed for those individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount 3144P HART® Temperature Transmitters.

**Prerequisites**
Knowledge of basic temperature fundamentals and temperature instrumentation.

### Rosemount - 3144P Fieldbus Temperature Transmitters – 2324 CEUs - 0.7

**Overview**
This 1-day course uses lecture and labs to maximize the hands on experiences and teach the student how to install, configure, calibrate, troubleshoot, and maintain the Rosemount 3144P Fieldbus Temperature Transmitters. The student will also learn the operation of the Field Communicator. Students who complete this course will be able to:

- identify 3144P parts and explain their functionality
- explain principles of operation of the 3144P
- design and build a Fieldbus segment
- configure, calibrate, and test 3144P Fieldbus Temperature transmitters using the Field Communicator
- properly install and troubleshoot the 3144P Fieldbus Transmitters

**Topics**
- 3144P Overview and Principles of Operation
- FOUNDATION™ fieldbus Overview
- Fieldbus Wiring
- Fieldbus Segment Design
- Fieldbus Function Blocks
- Test Equipment Selection
- Sensor Selection and Wiring
- Bench Testing 3144P Fieldbus Transmitters
- Field Communicator Operation
- Digital Trims/Calibration
- Installation and Start-Up
- Troubleshooting and Maintenance

**Note:** This product is also part of 2370 course.

**Audience**
This course is designed for those individuals responsible for the installation and maintenance of the Rosemount Model 3144P Fieldbus Temperature Transmitters.

**Prerequisites**
Knowledge of basic temperature fundamentals and temperature instrumentation.
Rosemount - 848 Fieldbus Temperature Transmitters – 2328
CEUs - 0.7

Overview
This 1-day course uses lectures and labs to maximize the hands-on experiences and teach the student how to install, configure, troubleshoot, and maintain the Rosemount 848T Fieldbus Temperature Transmitters. The student will also learn the operation of the Field Communicator. Students who complete this course will be able to:
- explain the principles of operation of the 848T
- configure, calibrate, and test the 848T Fieldbus temperature transmitter using the Field Communicator
- design and build a Fieldbus segment
- properly install and troubleshoot the 848T Fieldbus Transmitter

Notes: This product is also included in the 3-day 2370 Fieldbus Course.

Audience
This course is designed for those individuals responsible for the installation and maintenance of the Rosemount Model 848 Fieldbus Temperature Transmitters

Prerequisites
Knowledge of basic temperature fundamentals and temperature instrumentation.

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Rosemount - 3051S Electronic Remote Sensors System – 2309
CEUs - 0.7

Overview
This 1-day course uses lecture and labs to maximize the hands-on experiences and teach the student how to install, configure, calibrate, maintain, and troubleshoot the Rosemount 3051S ERS System. Students who complete this course will:
- identify transmitter parts and explain their functionality
- identify 3051S ERS Hi & Lo sensors
- explain the principles of operation of the ERS System
- configure and test the ERS system using AMS Device Manager and the Field Communicator
- perform zero trims and calibrate the ERS Sensors
- properly install & troubleshoot the 3051S ERS System

Notes: This product is also included in course 2333.

Audience
This course is designed for those individuals responsible for the installation, configuration, calibration, troubleshooting and maintenance of the Rosemount 3051S Electronic Remote Sensors (ERS™) Technology.

Prerequisites
None
### Rosemount - 3300 Guided Wave Radar Level Transmitter - 2332

**Overview**
This 1-day course uses lecture and labs to maximize the hands on experience and teach the student how to install, configure, calibrate, troubleshoot and maintain the Rosemount 3300 GWR Level & Interface Transmitters. Students who complete this course will be able to:
- explain the principles of operation of the 3300 GWR
- identify 3300 parts and explain their functionality
- understand the available probe options and when each should be used
- properly install the 3300 GWR
- configure and test the 3300 GWR
- properly troubleshoot the 3300 GWR transmitter using RCT software

**Topics**
- 3300 Overview/Principles of Operation
- Installation of the 3300 GWR
- Configuration of the 3300 GWR
- Field Communicator Operation
- AMS Device Manager Operation
- Radar Configuration Tools (RCT) Software Operation
- Calibration, Verification and Adjustments
- Troubleshooting and Maintenance
- Troubleshooting and Reading Tank Graphs Using RCT Software

Note: 3300 GWR is also included in the 3-day Level course #2333

**Audience**
This course is for those individuals responsible for the installation, configuration, verification and maintenance of the Rosemount 3300 Series Guided Wave Radar (GWR) Level Interface Transmitters.

**Prerequisites**
Knowledge of basic level fundamentals and instrumentation.

### Rosemount - 5300 High Performance Guided Wave Radar HART® Level Transmitter – 2337

**Overview**
This 1-day course uses lecture and labs to maximize the hands on experience and teach the student how to install, configure, troubleshoot and maintain the Rosemount 5300 High Performance GWR Transmitters. Students who complete this course will be able to:
- explain the principles of operation of the 5300 GWR
- identify 5300 GWR parts and explain their functionality
- understand the available probe options and when each should be used
- properly install the 5300 GWR
- configure and test the 5300 GWR
- understand how to setup the 5300 GWR to work in different applications
- properly troubleshoot the 5300 GWR Transmitter and Installation using Radar Master software

**Topics**
- 5300 Overview and Principles of Operation
- Installation of the 5300 GWR
- Wiring the 5300 GWR
- Configuration of the 5300 GWR
- Bench Testing the 5300 GWR
- Field Communicator Operation
- AMS Device Manager Operation
- Radar Master Software Operation
- Troubleshooting and Maintenance
- Tank & Application Troubleshooting and Echo Handling Using Radar Master Software

Note: 5300 GWR HART® Level transmitter is also included in the 3-day Level course 2333.

**Audience**
This course is designed for those individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount 5300 Series HART® Radar Level Transmitters.

**Prerequisites**
Knowledge of basic level fundamentals and instrumentation.

### Rosemount - 5600 Radar Level Transmitter – 2334

**Overview**
This 1-day course uses lecture and labs to maximize the hands on experience and teach the student how to install, configure, troubleshoot and maintain the Rosemount 5600 Series HART® Radar Level Transmitters. Students who complete this course will be able to:
- explain the principles of operation of the 5600 Radar
- identify 5600 Radar parts and explain their functionality
- properly install and wire the 5600 Radar
- configure and test the 5600 Radar
- understand how to setup the 5600 Radar to work in different applications
- properly troubleshoot the 5600 Radar Transmitter using Radar Master software

**Topics**
- 5600 Overview and Principles of Operation
- Installation of the 5600 Radar
- Wiring the 5600 Radar
- Configuration of the 5600 Radar
- Bench Testing the 5600 Radar
- 2210 LOI / Display Operation
- Field Communicator Operation
- AMS Device Manager Operation
- Radar Master Software Operation
- Troubleshooting and Maintenance
- Tank and Application Troubleshooting and Echo Handling using Radar Master Software

Note: This product is also included in the 3-day Level course 2333.

**Audience**
This course is designed for those individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount 5600 Series HART® Radar Level Transmitter.

**Prerequisites**
Knowledge of basic level fundamentals and instrumentation.
Overview
This 1-day course uses lecture and labs to maximize the hands-on experience and teach the student how to install, configure, troubleshoot and maintain the Rosemount 5400 Radar Transmitters. Students who complete this course will be able to:
- explain the principles of operation of the 5400 Radar
- identify 5400 Radar parts and explain their functionality
- properly install and wire the 5400 Radar
- configure and test the 5400 Radar
- understand how to setup the 5400 Radar to work in different applications
- properly troubleshoot the 5400 Radar Transmitter and the installation using Radar Master software

Topics
- 5400 Overview and Principles of Operation
- Installation of the 5400 Radar
- Wiring the 5400 Radar
- Configuration of the 5400 Radar
- Bench Testing the 5400 Radar
- Field Communicator Operation
- AMS Device Manager Operation
- Radar Master Software Operation
- Troubleshooting and Maintenance
- Tank and Application Troubleshooting and Echo Handling using Radar Master Software

Audience
This course is designed for those individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount 5400 HART® Radar Level Transmitter.

Prerequisites
Knowledge of basic level fundamentals and instrumentation.

Overview
This two-hour eLearning course will teach the student how to: install, configure, calibrate, maintain, and troubleshoot the Rosemount 5408 Non-Contacting Radar Level transmitter.

Topics
- How it works
- Configuration
- Maintenance procedure
- Troubleshooting the device

Audience
Maintenance, engineers, I&E techs, reliability engineers

Note: This product is also included in the 3-day Level course 2333.

Rosemount – Level Detector – 2140 – e2330
CEU – 0.2

Overview
This 2-hour eLearning course will teach students how to: install, configure, calibrate, maintain and troubleshoot the Rosemount 2140 Level Detector.

Topics
- How it works
- Configuration
- Maintenance procedure
- Troubleshooting the device

Audience
Maintenance, engineers, I&E techs, reliability engineers

Prerequisites
Some knowledge of boiler systems and instrumentation.
Overview
This 2-day course explains how Self Organizing Wireless Networks function and how they are installed, setup, configured and integrated. It emphasizes planning, proper installation and startup, configuration, maintenance, and integration. The course uses lectures and labs to maximize the hands on experience and teach the students. Students who complete this course will:
- correctly install and setup the 1420 & 1410 Wireless Gateway
- properly install and configure Wireless Transmitters
- properly integrate Host interfaces to the Wireless Gateway

Topics
- How Self Organizing Networks Function
- Self Organizing Networks Best Practices
- Network Components
- 1420 & 1410 Installation and Setup
- Network Parameters
- Wireless Transmitters Installation, Configuration, Maintenance and Calibration
- THUM Installation, Wiring and Configuration
- Integrating and Operating AMS Device Manager with the 1420 Wireless Gateway
- Operation of AMS Wireless SNAP-ON
- Modbus Serial Integration
- Modbus TCP Integration
- OPC Integration

Audience
This course is intended for technicians, engineers and other plant personnel who need to know how to design, install, setup, configure, maintain and troubleshoot Wireless Self Organizing Networks and their components.

Prerequisites
Some experience in Wireless Networks and Host integration would be helpful.

Overview
This 1-day course explains how Self Organizing Wireless Networks function and how they are installed, setup, and configured. It emphasizes planning, proper installation and startup, configuration and maintenance. The course uses lectures and labs to maximize the hands on experience and teach the students. Students who complete this course will:
- correctly install and setup the 1420 & 1410 Wireless Gateway
- properly install and configure Wireless Transmitters

Topics
- How Self Organizing Networks Function
- Self Organizing Networks Best Practices
- Network Components
- 1420 & 1410 Installation and Setup
- Network Parameters
- Wireless Transmitters Installation, Configuration, Maintenance and Calibration
- THUM Installation, Wiring, Configuration
- Integrating and Operating AMS Device Manager with the 1420 & 1410 Wireless Gateway and Wireless Devices

Audience
This course is intended for technicians, engineers and other plant personnel who need to know how to install, setup, configure, maintain and troubleshoot Wireless Self Organizing Networks and their components.

Prerequisites
Some experience in Wireless Networks and Host integration would be helpful.

Overview
The Wireless Pressure Gauge on-demand course offers a comprehensive set of “How to” lessons designed to bring an interactive learning environment over the internet directly to you at any time. By the end of the course, you will know how to specify, install, configure, maintain, and troubleshoot the gauge. In addition, the course provides learning to maximize the use of the Wireless Pressure Gauge’s new capabilities.
Overview
Learn the installation, calibration, maintenance and troubleshooting of measurement instrumentation using AMS Device Manager. This 3-day course teaches maintenance and calibration of measurement devices using AMS Device Manager software to communicate and track information. The student will learn how pressure and temperature transmitters function, are installed, and calibrated using AMS Device Manager. The course uses hands-on training, labs, and lecture to teach the student how to:
- configure and use AMS Device Manager correctly perform transmitter installation and setup procedures
- properly configure HART® transmitters
- properly calibrate transmitters
- perform basic troubleshooting-transmitters

Topics
- Configuring and Using AMS Device Manager
- Viewing and Modifying Devices
- Creating a Plant Database Hierarchy and Adding Devices
- AMS Device Manager Browser Functions
- Audit Trail
- HART® Communication
- HART Transmitters (3051C, 3144P)
- Test Equipment Selection
- Transmitter Installation and Configuration
- Transmitter Calibration
- AMS Calibration Assistant
- Intelligent Calibrators
- Transmitter Troubleshooting

Audience
The hands-on focus is on skills required by engineers, technicians, or others that are new to the plant or instrument environment.

AMS - AMS Device Manager w/Rosemount HART® Instruments – 7021
CEUs - 2.1

Rosemount - Interactive Plant Environment Pressure Transmitters – 2808
CEUs - 1.4

Overview
This 2-day course combines lectures with bench-top labs and uses the interactive plant for scenario based training. Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Pressure transmitters. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a “real world” plant environment.

Topics
- Identify Transmitter Parts and Functionality
- Explain the Principles of Operation of Pressure Transmitters
- Configure, Calibrate and Test Pressure Transmitters using the Field Communicator
- Properly Install and Troubleshoot Pressure Transmitters
- Students shall ensure proper PPE and safety measures while working on the plant.

Rosemount - Interactive Plant Environment Temperature Transmitters – 2821
CEUs - 0.7

Overview
This 1-day course combines lectures with bench-top labs and uses the interactive plant for scenario based training. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a “real world” plant environment.

Topics
- Identify Transmitter Parts and Functionality
- Explain the Principles of Operation of Temperature Transmitters
- Configure, Calibrate and Test Temperature Transmitters using the Field Communicator
- Properly Install and Troubleshoot Temperature Transmitters.
- Students shall ensure proper PPE and safety measures while working on the plant.

Audience
Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Temperature transmitters.

Rosemount - Interactive Plant Environment Rosemount Pressure & Temperature Transmitters – 2898
CEUs - 2.1

Overview
This 3-day course combines lectures with bench-top labs and uses the interactive plant for scenario based training. Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Pressure and Temperature transmitters. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a “real world” plant environment.

Topics
- Explain the Difference between HART® & Analog Transmitters
- Identify Transmitter Parts and Functionality
- Explain the Principles of Operation of Pressure and Temperature Transmitters
- Configure, Calibrate and Test Pressure and Temperature Transmitters using the Field Communicator
- Properly Install and Troubleshoot Pressure and Temperature Transmitters.
- Students shall ensure proper PPE and safety measures while working on the plant.

Rosemount - AMS Trex Device Communicator - e2300
CEUs – 0.1

Overview
E2300 AMS Trex Device Communicator is an introductory course with lessons on theory of operation, model number and spare part selection, communicator configuration, connecting, communicating, and/or powering HART®, FOUNDATION™ Fieldbus, and wireless devices and positioners, unit maintenance, and troubleshooting the unit and device connectivity.
Rosemount - Interactive Plant Environment Pressure, Temperature, MultiVariable™ Flow Transmitters – 2829 CEUs - 2.8

Overview
This 4-day course combines lectures with bench-top labs and uses the interactive plant for scenario-based training. Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Pressure, Temperature, and Multi-Variable Flow transmitters. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a "real world" plant environment.

Topics
- Identify transmitter parts and functionality
- Explain the principles of operation of the transmitters
- Configure, calibrate and test transmitters using the field communicator, AMS Device Manager, and Engineering Assistant software
- Configure the compensated flow parameters
- Properly install and troubleshoot pressure, temperatures and multi-variable flow transmitters

Audience
Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Pressure, Temperature, and Multi-Variable Flow transmitters.

Rosemount - Interactive Plant Environment MultiVariable™ Flow Transmitter – 2812 – Continued...

- Students shall ensure proper PPE and safety measures while working on the plant.

Audience
Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount 3051SMV Multi-Variable Flow transmitters.

Rosemount - Interactive Plant Environment Level Transmitters – 2896 CEUs - 1.4

Overview
This 2-day course combines lectures with bench-top labs and uses the interactive plant for scenario-based training. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a "real world" plant environment.

Topics
- Identify Transmitter Parts and Functionality
- Explain the Principles of Operation the Transmitters
- Configure, Calibrate/Verify and Test Radar Level Transmitters using the Field Communicator, Radar Master Software
- Understand How to Setup the Radars in Different Applications
- Properly Install and Troubleshoot the 5300 & 5400 Transmitters and their Applications

Students shall ensure proper PPE and safety measures while working on the plant.

Audience
Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount 5300 & 5400 Radar Level transmitters.

Rosemount Interactive Plant Environment Wireless Self Organizing Networks – 2875 CEUs: 2.5

Overview
This 3.5-day course combines classroom theory with hands-on labs. Learn by doing with the Interactive Plant Environment. This unique training setting provides a safe and realistic environment to elevate skills and knowledge through direct interaction with live wireless networks and devices. This course is designed for engineers and technicians whose responsibilities include: startup, configuration, troubleshooting, and host integration of wireless networks and devices. Be ready to learn in a "real world" plant environment.

Topics
- Perform a wireless network planning walkthrough
- Know and operate wireless network planning tools
- Install a wireless network following wireless best practices
- Installation and configuration of wireless devices
- Installation and configuration of THUMs
- Troubleshoot Wireless networks, performance and connectivity
- Connect and prove proper MOBUS communications
- Connect and prove proper OPC communications

Audience
Engineers and Instrument Technicians

Prerequisites
Some experience in Wireless Networks and Host integration would be helpful, but not required. Some basic instrument knowledge would be beneficial.
Rosemount - Interactive Plant Environment - Hydrastep Water and Steam Monitoring System – 2868 CEUs – 1.1

Overview
This 1.5-day course combines classroom discussions, hand-on labs, and execution of work orders in the Interactive Plant Environment. Students will increase skills and knowledge through: installation, configuration, testing, troubleshooting, and maintenance of the Rosemount Hydrastep Monitoring system.

Upon completion students will be able to:
- Explain the Principles of Operation for the Hydrastep System
- Identify Hydrastep components and explain their functionality
- Setup, Configure and test the Hydrastep
- Understand how to properly install and troubleshoot the Hydrastep system

Topics
- 2468 Hydrastep Overview/Principles of Operation
- Understand Major Components
  - Water Columns
  - Electrodes
  - Remote Display
  - Cables
- Explain the available outputs
- Explain the basic specifications
- Understand the proper installation for the Water Columns
- Know how to wire the Electrodes to the Control Unit
- Configure switches on Input Board
- Configure switches on Display Board
- Configure Switches on the Relay Board
- Remote Display Wiring

Audience
This course is designed for those individuals responsible for the installation, configuration, calibration, troubleshooting, and maintenance of the Rosemount 2468 Hydrastep Water and Steam Monitoring System.

Prerequisites
Some knowledge of boiler systems and instrumentation.

Rosemount - Interactive Plant Environment Troubleshooting: Pressure, Temperature, MultiVariable, & Process Level – 2850

Overview
This 3-day course utilizes the Interactive Plant Environment’s live process to provide students with troubleshooting scenarios focused on Rosemount products. Students will be tasked with real world issues which require critical thinking to properly identify the problem, and then repair, or propose a new solution. Labs will include, but are not limited to: installation, 4-20 mA loop complications, application issues, incorrect specifications, and process irregularities.

Topics
- Identify troubleshooting theory
- Analyze process issues with the following measurements points:
  - Pressure
  - Temperature
  - MultiVariable™ Flow
  - Differential Pressure Level
  - Guided Wave Radar
  - Radar Level

Audience
Instrument technicians, I&E’s

Prerequisites
Students should have at least two years of working experience and knowledge of: installation, configuration, commissioning, calibration, maintenance, and some basic troubleshooting experience.

Rosemount - 3300 & 5300 Guided Wave Radar Transmitters – 2395 CEUs - 0.7

Overview
This 1-day course uses lecture and labs to maximize the hands-on experience and teach the student how to install, configure, troubleshoot and maintain the Rosemount 3300 & 5300 Series HART® Radar Level Transmitters.

Topics
Students who complete this course will be able to:
- explain the principles of operation of the 3300/5300 GWR
- identify 3300/5300 GWR parts and explain their functionality
- understand available probe options and when each should be used
- properly install and wire the 3300/5300 GWR
- configure and test the 3300/5300 GWR
- understand how to setup the 3300/5300 GWR to work in different applications
- properly troubleshoot the 3300 & 5300 GWR and the Installation using Radar Master software

Prerequisites
Knowledge of basic level fundamentals and instrumentation
Rosemount - 3095MV & 3051SMV MultiVariable™ Transmitters – 2393 CEUs - 0.7

Overview
This 1-day course uses lecture and labs to teach the student how to install and maintain the Rosemount 3095MV & 3051SMV Smart Transmitters. The student will also learn the operation and interface capabilities of the Field Communicator. Students who complete this course will:
- identify transmitter parts and explain their functionality
- explain the principles of operation of the transmitter
- configure and test using the Field Communicator
- configure the compensated flow parameters using Engineering Assistant software with the 3095MV & 3051SMV
- properly install/troubleshoot transmitters

Topics
- DP Flow Fundamentals
- Overview and Principles of Operation
- Test Equipment Selection
- Bench Testing the Smart Transmitters
- Operation of the Field Communicator and AMS Device Manager
- Digital Trims/Calibration
- Installation and Start-Up
- Troubleshooting and Maintenance
- Configure/Wire/Setup the HART® Tri-Loop
- Operation of Engineering Assistant software

Audience
This course is designed for those individuals responsible for the installation and maintenance of the Rosemount 3095MV or 3051SMV Transmitter.

Prerequisites
Knowledge of basic pressure, temperature, and DP Flow fundamentals /instrumentation.

Rosemount - 5300 & 5400 Radar Level Contacting & Non-Contacting Transmitters – 2396 CEUs - 0.7

Overview
This 1-day course uses lecture and labs to teach the student how to install, configure, troubleshoot and maintain the Rosemount 5400 & 5300 Series HART® Radar Level Transmitters. Students who complete this course will be able to:
- explain the principles of operation of the 5300/5400 radar
- identify 5300/5400 parts and explain their functionality
- properly install and wire the 5300/5400 Radar
- configure and test the 5300/5400 Radar
- properly troubleshoot the 5300/5400 Radar transmitter and installation using Radar Master software

Topics
- 5300/5400 Overview and Principles of Operation
- Installation of the 5300/5400 Radar
- Configuration of the 5300/5400 Radar
- Bench Testing the 5300/5400 Radar
- Field Communicator Operation
- AMS Device Manager Operation
- Radar Master Software Operation
- Calibration, Verification and Adjustments
- Troubleshooting and Maintenance
- Tank & Application/Probe
- Troubleshooting and Echo Handling Using Radar Master Software

Audience
This course is designed for those individuals responsible for the installation and maintenance of the Rosemount 5400 Pressure and 5300 Series HART® Radar Level Transmitters.

Prerequisites
Knowledge of basic level and interface fundamentals and instrumentation.

Rosemount - 3051C Pressure Transmitter & 3144P Temperature Transmitter – 2398 CEUs - 0.7

Overview
This 1-day course uses lectures and labs to teach the student how to install and maintain the Rosemount 3051C Pressure and 3144P Smart Temperature Transmitter. The student will also learn the operation and inter-face capabilities of the Field Communicator. Students will:
- explain the differences between Smart & Analog transmitters
- identify 3051C and 3144P parts and functionality
- explain the principles of operation of the 3051C and 3144P Transmitters
- configure and test the 3051C Pressure and 3144P Temperature Transmitters using the Field Communicator
- properly install/ troubleshoot the 3051 Pressure and 3144P Temperature transmitters

Topics
- Smart and Analog Transmitters
- 3051C & 3144P Overview and Principles of Operation
- Test Equipment Selection
- Sensor Selection and Wiring
- Bench Testing the 3051C & 3144P Smart Transmitter
- Field Communicator Operation
- Digital Trims/Calibration
- Installation and Start-up
- Troubleshooting and Maintenance

Audience
This course is designed for those individuals responsible for the installation and maintenance of the Rosemount 3051 Pressure, and 3144P Temperature Transmitters.

Prerequisites
Knowledge of basic pressure and temperature fundamentals and instrumentation.
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<tbody>
<tr>
<td>Rosemount - Smart Magnetic Flowmeter - 8700 Series - 2340</td>
<td>This 1-day course consists of a blend of lectures and hands-on exercises that cover how to install, configure, and maintain the Rosemount 8700 Series Magnetic Flowmeter Systems composed of the Model 8712 and 8732 transmitters and the 8705 Flanged and 8711 Wafer Sensors. The students will learn the operation and capabilities of Local Operator Interface (LOI), 475 Field Communicator, and/or AMS Device Manager and how to use these tools to perform configuration. Common issues encountered and troubleshooting techniques will also be covered.</td>
<td>Explain the Difference and Capabilities of the Rosemount 8700 Series Magnetic Flowmeters, Identify Transmitter and Sensor Parts and Explain Functionality, Explain Faraday’s Law and the Principles of Operation of Magnetic Flowmeter System, Configure and Test Transmitters Using the LOI, Field Communicator, or AMS Device Manager, Properly Install/Troubleshoot the Rosemount Magnetic Flowmeter System</td>
<td>This course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Rosemount 8700 Series Magnetic flowmeter. Typical job functions include: maintenance technicians, instrument technicians, and instrumentation engineers.</td>
<td>Knowledge of basic flow fundamentals and instrumentation.</td>
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<tr>
<td>Rosemount - Smart Magnetic Flowmeters with AMS Device Manager - 8700 Series - 2340A</td>
<td>This 1-day course consists of a blend of lectures and hands-on exercises that cover how to install, configure, and maintain the Rosemount 8700 Series Magnetic Flowmeter Systems composed of the Model 8712 and 8732 transmitters and the 8705 Flanged and 8711 Wafer Sensors. The students will learn the operation and capabilities of AMS Device Manager and how to use this tool to perform configuration. Common issues encountered and troubleshooting techniques will also be covered.</td>
<td>Explain the Difference and Capabilities of the Rosemount 8700 Series Magnetic Flowmeters, Identify Transmitter and Sensor Parts and Explain Functionality, Explain Faraday’s Law and the Principles of Operation of Magnetic Flowmeter system, Configure and Test Transmitters Using AMS Device Manager, Properly Install/Troubleshoot the Rosemount Magnetic Flowmeter System</td>
<td>This course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Rosemount 8700 Series Magnetic flowmeter. Typical job functions include: maintenance technicians, instrument technicians, and instrumentation engineers.</td>
<td>None required. However, basic understanding of the fundamentals of flow measurement, electricity, analog and frequency signal processing are assumed.</td>
</tr>
<tr>
<td>Rosemount - 8800 Series Smart Vortex Flowmeter with HC475 - 2341</td>
<td>This 1-day course consists of a blend of lectures and hands-on exercises that cover how to install, configure, and maintain the Rosemount 8800 Series Smart Vortex flowmeter systems. The students will learn the operation and capabilities of the Local Operator Interface and HC475 Field Communicator and how to use these tools to perform configuration. Common issues encountered and troubleshooting techniques will also be covered.</td>
<td>Explain the Differences and Capabilities of the Rosemount 8800 Series Vortex Flowmeters, Explain the von Karman Effect and the Principles of Operation of Vortex Flowmeters, Identify Vortex Parts and Explain Functionality, Configure and Test Transmitters using Field Communicator or AMS Device Manager, Properly Install and Troubleshoot the Rosemount 8800 Series Vortex Flowmeter System</td>
<td>This course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Rosemount 8800 Series Vortex Flowmeter. Typical job functions include: maintenance technicians, instrument technicians, and instrument engineers.</td>
<td>None required. However, basic understanding of the fundamentals of flow measurement, electricity, analog &amp; frequency signal processing are assumed.</td>
</tr>
</tbody>
</table>
Overview
This 1-day course consists of a blend of lectures and hands-on exercises that cover how to install, configure, and maintain the Rosemount 8800 Series Vortex flowmeter systems. The students will learn how to use AMS Device Manager to perform configuration. Common issues encountered and troubleshooting techniques will also be covered.

Topics
- Explain the Differences and Capabilities of the Rosemount 8800 Series Vortex Flowmeters
- Explain the von Karman Effect and Principles of Operation of Vortex Flowmeters
- Identify Vortex Parts and Explain Functionality
- Configure and Test Transmitters using the AMS Device Manager
- Properly Install and Troubleshoot the Rosemount 8800 Series Vortex Flowmeter System

Audience
This course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Rosemount 8800 Series Vortex Flowmeter. Typical job functions include; maintenance technicians, instrument technicians, and instrument engineers.

Prerequisites
None required. However, basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing are assumed.

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Overview
This curriculum group contains c6001, c6002, c6003 and c6004. This entire curriculum may be purchased at a discounted price, or each section of the curriculum may be purchased individually. Unlimited access for 3 months. Duration: 3 Hours.

Topics
- theory
- product offering and model selection
- vortex sizing
- installation best practices for piping, mounting, remote electronics and wiring
- device configuration for the 475 HART® Field Communicator and the AMS Device Manager
- using the configuration tools
- electronics, sensor and process troubleshooting
- vibration, mass balancing, and filter troubleshooting.

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Overview
This curriculum is part of the Vortex Online Instrument and Electrical (I&E) Technician Training. It may be purchased individually or with the c6000 curriculum. Unlimited access for 3 months. Duration: 1 HR

Topics
- key parameters for a basic vortex configuration
- how to use AMS and the Field Communicator to configure an 8800D Vortex meter
- advanced configuration for special units of measure, base volume units - density ratio, pulse output, totalizer, display variables and saturated steam using the MTA option

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Overview
This curriculum is part of the Vortex Online Instrument and Electrical (I&E) Technician Training. It may be purchased individually or with the c6000 curriculum. Unlimited access for 3 months. Duration: .5 hour

Topics
- theory of operation
- overview of the vortex meter product offering
- model selection
- discuss vortex sizing

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Overview
This curriculum is part of the Vortex Online Instrument and Electrical (I&E) Technician Training. It may be purchased individually or with the c6000 curriculum. Unlimited access for 3 months. Duration: .5HR

Topics
- piping requirements
- mounting
- remote electronics
- wiring

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Overview
This curriculum is part of the Vortex Online Instrument and Electrical (I&E) Technician Training. It may be purchased individually or with the c6000 curriculum. Unlimited access for 3 months. Duration: 1HR

Topics
- troubleshooting scenarios
- electronics, sensor and process troubleshooting
- vibration, mass balancing and filtering troubleshooting
Rosemount - 8700 Series Smart Magnetic Flowmeter Short Course - 2339SM
CEUs - 0.4

Overview
This 1/2-day field class is a condensed version of the 2340 course briefly reviewing the theory of operation, meter components and installation. The focus of the class is to provide a hands-on experience configuring and troubleshooting of the 8700 Magnetic metering system composed of the Model 8712 and 8732 Transmitters and the 8705 Flanged and 8711 Wafer Sensors. The students will learn the operation and capabilities of the Local Operator interface & HC475 and how to use these tools to perform configuration. Common issues encountered and troubleshooting techniques will also be covered.

Topics
- Magnetic Flowmeter System
- Smart vs. Analog Transmitters
- Flow Tube Selection
- Configuring Using LOI and AMS Device Manager
- Local Operator Interface Functions
- Positive Zero Return
- Auxiliary Functions and Special Units
- Signal Conditioning
- System Troubleshooting and Maintenance
- Bench Testing/Digital Trims
- Process Noise and Grounding Diagnostics
- Meter Verification Diagnostics

Audience
This course is intended as a refresher course for anyone that is involved with properly configuring and troubleshooting a Rosemount 8700 Series Smart Magnetic Flowmeter. Typical job functions include; maintenance technicians, instrument technicians and instrumentation engineers. This class is also intended to be taught as two, 1/2-day repeat sessions to accommodate customers who need to train their entire department but must also maintain the operation of their plant by scheduling their employees between an AM/PM sessions.

Prerequisites
Some prior experience working with Rosemount Magnetic Flowmeters meters is recommended. However, students with no past experience can also benefit. For all attendees, it is assumed they have a basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing.

Rosemount - 8800 Series Smart Vortex Flowmeter Short Course - 2339SV
CEUs – 0.4

Overview
This 1/2-day field class is a condensed version of the 2341 course briefly reviewing the theory of operation, meter components and installation. The focus of the class is to provide a hands-on experience configuring and troubleshooting of the 8800 Vortex metering system. The students will learn the operation and capabilities of the Local Operator interface & HC475 and how to use these tools to perform configuration. Common issues encountered and troubleshooting techniques will also be covered.

Topics
- Explain the Differences and Capabilities of the Rosemount 8800 Series Vortex Flowmeters
- Explain the von Kármán Effect and Principles of Operation of Vortex Flowmeters
- Identify Vortex Parts and Explain Functionality
- Configure and Test Transmitters using the AMS Device Manager
- Properly Install and Troubleshoot the Rosemount 8800 Series Vortex Flowmeter System

Audience
This class is intended as a refresher course for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Rosemount 8700 Series Smart Magnetic Flowmeter. Typical job functions include; maintenance technicians, instrument technicians and instrumentation engineers. This class is also intended to be taught as two, 1/2 day repeat sessions to accommodate customers who need to train their entire department but must also maintain the operation of their plant by scheduling their employees between an AM/PM sessions.

Prerequisites
None required. However, a basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing are assumed.

Rosemount - Interactive Plant Environment - 8700 Series Smart Magnetic Flowmeters - 5715
CEU – 0.7

Overview
This one-day course consists of a blend of lectures and hands-on exercises that cover the installation, configuration, calibration checks and troubleshooting of the Rosemount 8700 Series Magnetic Flowmeter Systems composed of the Model 8712 and 8732 Transmitters as well as the 8705 Flanged and 8711 Wafer Sensors. The students will learn the operation and capabilities of the Local Operator Interface, and how to use these tools to perform configuration. Common issues encountered and troubleshooting techniques will also be covered. This course includes hands-on exercises within the Inter Active Plant Environment training facility. Customer exclusive classes can be customized to address specific transmitter and configuration tools specific to that customer.

Audience
This one-day course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Rosemount 8700 Series Smart Magnetic flowmeter. Typical job functions include; maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
None required. However, a basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing are assumed.
### Rosemount - Interactive Plant Environment - 8800 Series Smart Vortex Flowmeters - 5716

CEU – 0.7

**Overview**
This one-day course consists of a blend of lectures and hands-on exercises that cover how to install, configure and maintain the Rosemount 8800 Series Smart Vortex flowmeter systems. Students will learn the operation and Local Operator Interface as well as how to use these tools to perform configuration. Common issues encountered and troubleshooting techniques will also be covered. This course includes hands-on exercises within the Inter Active Plant Environment training facility. Customer exclusive classes can be customized to address specific transmitter and configuration tools specific to that customer.

**Audience**
This one-day course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Rosemount 8800 Series Smart Vortex flowmeter. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers.

**Prerequisites**
None required. However, a basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing are assumed.

| Rosemount - Magnetic 8700 Series & Vortex Flowmeters 8800 Series – 2394 |
|-----------------------------|-----------------------------|
| **CEUs** | 0.7 |
| **Overview** | This 1-day course is an abbreviated version of the 2340 and 2341 courses for Rosemount 8700 Series Magnetic and 8800 Series Vortexmeters. Typically, 2/3 of the course time is spent on Rosemount's 8800 Vortex flowmeter and 1/3 on Rosemount's 8700 Magnetic Flowmeter. Theory of operation, meter components and installation of each flowmeter are covered. The focus of the class is to provide a hands-on experience configuring and reviewing the most common troubleshooting issue and best practices for resolution. |
| **Topics** | • After attending the course the student will be able to do the following for both the Rosemount Magnetic and Vortex flowmeters:  
  - Briefly Explain the Fundamentals for How Each Flowmeter Works and the Function of the Key Components  
  - Have a Basic Understanding of the Installation Best Practices for Orienting, Mounting and Wiring the Sensor and Transmitter  
  - Perform a Basic Configuration of the Metering System for Various Applications  
  - Diagnose and Know How to Correct the Most Common Meter and Process Issues |
| **Audience** | This combined class is intended anyone that is involved with properly configuring and troubleshooting a Rosemount 8700 Smart Magnetic & 8800 Smart Vortex Flowmeters. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers. |
| **Prerequisites** | This being a 1-Day class covering two flowmeters, some prior experience working with Rosemount's Magnetic and Vortex flowmeters is recommended. However, students with no past experience can also benefit if their learning objectives are to get a basic introduction to operation, installation, configuration and troubleshooting. For all attendees, it is assumed they have a basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing. |

### Micro Motion - Coriolis, Magnetic & Vortex Wireless – 2383

| **CEUs** | 0.70 |
| **Overview** | This 1-day course consists of a blend of lectures and hands-on exercises that cover a basic overview of wireless capabilities with a Micro Motion Coriolis, Rosemount 8700 Series Magnetic and 8800 Series Vortexmeters. Based on customer need, the class can be taught for each of the individual products. The course provides a step by step process for the following: how to install and wire a 775 Smart Wireless THUM to each transmitter, how to configure the THUM, how to configure the 1420 Wireless Gateway to the THUM using AMS Device Manager and how to add and view the Micro Motion and Rosemount transmitters to the gateway. |
| **Topics** | • Explain the Fundamentals for how a Micro Motion Coriolis, Rosemount 8700 Series Magnetic & 8800 Series Vortex Flowmeters Work with a 1420 Wireless Gateway and 775 Smart THUM Adapter  
  - Install and Wire a 775 Smart THUM to Micro Motion and Rosemount Transmitters  
  - Connect to and Configure the Micro Motion and Rosemount Transmitters to work with a 1420 Wireless Gateway  
  - Configure a 775 Smart THUM and the Transmitters to Communicate on the Gateway using AMS Device Manager |

**Audience**
This course is intended for anyone that is involved with installing, wiring, configuring and troubleshooting a Micro Motion Coriolis, Rosemount 8700 Magnetic & 8800 Vortex flowmeters with a 775 Wireless THUM. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers.

**Prerequisites**
General understanding of the HART® protocol and operation and configuration of a Micro Motion Coriolis, Rosemount 8700 Magnetic and 8800 Vortex meters is assumed.
Micro Motion - Coriolis & Rosemount
8700 Magnetic Flowmeters – 2384
CEUs - 0.7

Overview
This 1-day field class provides hands-on training on both the Coriolis and Magnetic Flowmeters. Typically, 2/3 of the course time is spent on Micro Motion's Coriolis meter and 1/3 on Rosemount's 8700 Magnetic Flowmeter. Theory of operation, meter components and installation of each flowmeter are covered. The focus of the class is to provide a hands-on experience configuring and troubleshooting best practices.

Students will learn the Micro Motion Series 1000/2000 transmitters using one of these configuration tools; Prolink III, HC475, AMS Device Manager or Series 3000 display interface devices. Public field classes typically use Prolink III for configuring the Micro Motion transmitters and the HC475 will be used for the Rosemount 8700 Magnetic flowmeter.

Customers can choose which configuration device is used for classes held at their site.

Topics
After attending the course, the student will be able to do the following for both Micro Motion's Coriolis and Rosemount 8700 Magnetic flowmeters:

- Briefly Explain the Fundamentals for How Each Flowmeter Works and the Function of the Key Components
- Basic Understanding of the Installation Best Practices for Orienting, Mounting and Wiring the Sensor and Transmitter
- Perform a Basic Configuration of the Metering System for Various Applications
- Diagnose and Know How to Correct the Most Common Meter and Process Issues

Audience
This combined class is intended anyone that is involved with properly configuring and troubleshooting a Micro Motion flow and density meter and Rosemount 8700 Smart Magnetic Flowmeters. Typical job functions include; maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
Some prior experience working with Micro Motion Coriolis & Rosemount 8700 Magnetic flowmeters is recommended. However, students with no past experience can also benefit. A basic understanding of the fundamentals of flow measurement, electricity, analog and frequency signal processing is assumed.

Micro Motion - Coriolis & Rosemount
8800 Vortex Flowmeters – 2387
CEUs - 0.7

Overview
This 1-day field class provides hands-on training on both the Coriolis and Vortex Flowmeters. Typically, 2/3 of the course time is spent on Micro Motion's Coriolis meter and 1/3 on Rosemount's 8800 Vortex Flowmeter. Theory of operation, meter components and installation of each flowmeter are covered. The focus of the class is to provide a hands-on experience configuring and troubleshooting best practices.

Students will learn the Micro Motion Series 1000/2000 transmitters using one of these configuration tools; Prolink III, HC475, AMS Device Manager or Series 3000 display interface devices. Public field classes typically use Prolink III for configuring the Micro Motion transmitters and the HC475 will be used for the Rosemount 8800 Vortex flowmeter.

Customers can choose which configuration device is used for classes held at their site.

Topics
Students will be able to do the following for both Micro Motion's Coriolis and Rosemount 8800 Vortex flowmeters:

- Briefly Explain the Fundamentals for How Each Flowmeter Works and the Function of the Key Components
- Have a Basic Understanding of the Installation Best Practices for Orienting, Mounting and Wiring the Sensor and Transmitter
- Perform a Basic Configuration of the Metering System for Various Applications
- Diagnose and Know how to Correct the Most Common Meter and Process Issues
- Configure the Metering System to Measure Available Process Variables from the Device for Their Application
- Learn a Step by Step Process to Perform Basic Troubleshooting of the Most Common Meter and Process Issues

Audience
This combined class is intended anyone that is involved with properly configuring and troubleshooting a Micro Motion flow and density meter and Rosemount 8800 Vortex Flowmeters.

Prerequisites
Some prior experience with Micro Motion Coriolis & Rosemount 8800 Vortex flowmeters. A basic understanding of the fundamentals of flow measurement, electricity, analog and frequency signal processing.

Rosemount - Tank Gauging Technical
Product Training - RTG101
CEUs - 3.5

Overview
This 5-day Tank Gauging Technical Product Training focuses on the 5900S system, our Wireless Tank Gauging System, a little about Rex and Pro, as well as other field equipment relevant for the Rosemount Tank Gauging system. The training covers installation, configuration and troubleshooting of our products, as well as general TankMaster functions. Students who complete this course will:

- correctly perform installation and setup procedures
- properly configure Tank Gauging System
- plan a Wireless installation
- perform basic troubleshooting

Topics
- System Overview
- Perform basic troubleshooting
- 2410 TankHub
- 5900 Gauges
- Rosemount 2240S
- Rosemount 2230 Display
- 5300/5400 Gauges
- Field Communication
- Electrical and Mechanical Installation
- System Configuration
- LPG/LNG
- Wireless
- AMS Wireless Snap-On
- Gateway
- Emulation
- SIL
- Troubleshooting

Audience
This course is customized for service, project, and sales engineers. The course includes both practical and theoretical training.

Prerequisites
This course is suitable for service, project, and sales engineers, and is a good start for new employees and customers.
### Overview
This 4-day TankMaster Training covers more detailed information about TankMaster functions. Students who complete this course will be able to:
- Perform System Configuration
- Configure Host Communication
- Properly use Redundancy
- Use Batch Handling
- Program Basic Custom Views
- Perform Basic Troubleshooting

### Topics
- System Overview
- Volume Calculations
- WinOpi Tools Menu
- Host Communication and OPC
- TankMaster Batch
- Custom Views and Translation
- Network Basics
- TankMaster to Enraf
- Redundancy
- Administrator Program Backup & Restore
- TankMaster Hybrid & HTG
- Troubleshooting

### Audience
This course is suitable for anyone who works with TankMaster, including customers who is using WinOpi as the operator interface. The course includes both practical and theoretical training.

### Prerequisites
It is required that you previously attended the RTG101 Technical Product Training course or have very good knowledge of the Rosemount Tank Gauging System.

### Rosemount - Tank Gauging L1 Training – RTG 110
CEUs – 2.1

This course is designed for personnel responsible for the installation, configuration, verification and maintenance of the Rosemount PRO/5600, REX/3900 and Raptor/5900 Tank Gauging Systems including Smart Wireless solutions.

### Overview
This 3-day Tank Gauging Technical Product Training focuses on the complete 5900, REX and PRO series tank gauging systems plus wireless application. Configuration via TankMaster(TM) WinSetup software. The training covers installation, configuration and troubleshooting of our products, as well as general TankMaster(TM) functions.

Students who complete this course will:
- Correctly perform installation and setup procedures
- Properly configure Tank Gauging System using TankMaster
- Perform basic troubleshooting

### Topics
- Rosemount TankMaster
- Rosemount 2460 System Hub
- Rosemount 2180 Field Communication Unit
- Rosemount 2410 Tank Hub
- Rosemount 5900 Radar Level Gauge
- Rosemount 2240 Multi-Temp Transmitter
- Rosemount 644 Single Temp Transmitter
- Rosemount 2230 Graphical Field Display
- Rosemount 1420/1410 Wireless Gateways
- Rosemount 775 THUM Adapter
- Rosemount REX 3900 Series
- Rosemount PRO 5600 Series
- Electrical and mechanical installation
- Field communication including Modbus and FF
- Commissioning, verification and troubleshooting

### Audience
This is a general, all-inclusive, start-from-scratch course that is suitable for both commissioning and maintenance personnel as well as project and engineering personnel involved in tank gauging systems.

### Prerequisites
No previous knowledge about the Rosemount tank gauging system is required to participate in this course. It is recommended that participants have some general knowledge about instrumentation and computers.

### Rosemount - Tank Gauging 5900 Series Training Level 1 – RTG 111
CEUs – 0.7

Overview
This 1-day Tank Gauging Technical Product Training focuses on the 5900 (Raptor) Series. Configuration via TankMaster(TM) WinSetup software. The training covers installation, configuration and troubleshooting of our products, as well as general TankMaster(TM) functions.

Students who complete this course will:
- Correctly perform installation and setup procedures
- Properly configure Tank Gauging System using TankMaster
- Perform basic troubleshooting

### Topics
- Rosemount TankMaster
- Rosemount 2410 Tank Hub
- Rosemount 5900 Radar Level Gauge
- Rosemount 2240 Multi-Temp Transmitter
- Rosemount 644 Single Temp Transmitter
- Rosemount 2230 Graphical Field Display
- Field communication including Modbus and FF
- Commissioning, verification and troubleshooting

### Audience
This course is designed for personnel responsible for the installation, configuration, verification and maintenance of the Rosemount Raptor/5900 Tank Gauging Systems.

### Prerequisites
No previous knowledge about the Rosemount tank gauging system is required to participate in this course. It is recommended that participants have some general knowledge about instrumentation and computers.
Rosemount – TankMaster Training Level 1 – RTG 120
CEUs – 0.7

Overview
This 1-day TankMaster Training covers the Inventory Management application (WinOpi). The course is suitable for anyone who works with TankMaster using WinOpi as the operator’s interface. The training covers inventory configuration and management, reports, user accounts and program access control, operator handling of inventory, as well as alarm system and batch system.

Topics
- Correctly perform installation of TankMaster
- Properly configure TankMaster Inventory Management System
- Operational use of TankMaster WinOpi application
- System Overview

Audience
This course is designed for personnel responsible for installation, configuration, verification and maintenance of the Rosemount Raptor/5900 Tank Gauging Systems.

Prerequisites
No previous knowledge about Rosemount Tank Gauging system is required to participate in this course. It is recommended that participants have some general knowledge about instrumentation and computers.

Rosemount - Tank Gauging REX/PRO Product Training – RTG130

Overview
This 1-day Tank Gauging Technical Product Training focuses on the REX and PRO series systems. The training covers installation, configuration and troubleshooting as well as general TankMaster functions. Students who complete this course will:
- Correctly perform installation and setup procedures
- Properly configure Tank Gauging System using TankMaster
- Perform basic troubleshooting

Topics
- System Overview
- REX 3900 Series
- PRO 40 Series
- Field Communication
- Electrical and Mechanical Installation
- System Configuration
- LPG/LNG
- Emulation
- Troubleshooting

Audience
This course is designed for personnel responsible for the installation, configuration, verification and maintenance of the Rosemount PRO/5600 and REX/3900 Tank Gauging Systems.

Prerequisites
It is necessary that participants have attended the RTG120 course prior to taking this course.

Rosemount – TankMaster Training Level 2 – RTG220
CEUs – 0.7

Overview
This 1-day TankMaster training covers more detailed information about TankMaster advanced functions. This course is suitable for anyone who works with TankMaster from an IT and networking aspect with management of clients, redundancy, Tankmaster.Net web server, host interfacing to 3rd party applications and program access control.

Topics
- Correctly perform installation of TankMaster systems
- Properly configure TankMaster networking applications
- Perform basic troubleshooting of TankMaster applications
- System Overview

Audience
This course is designed for personnel responsible for the installation, configuration, operation and maintenance of the Rosemount TankMaster Systems focusing on server/client/web and networking functions.

Prerequisites
It is necessary that participants have attended the RTG120 course prior to taking this course.
### Rosemount - MLT Process Gas Analyzers – 2110
#### CEUs – 2.1

**Overview**
This 3-day course is a classroom training where students learn principles and practical operation of MLT analyzers. Through hands-on training, the student will learn on how to install, maintain, and troubleshoot the MLT analyzer.

Using MLT Analyzer demo units, students will:
- Understand the Photometric measurement principles such as the theory of Infrared and Ultraviolet Spectrometry, Paramagnetic and Thermal Conductivity
- Learn the signal processing of the electronic boards.
- Learn the test procedure for troubleshooting and diagnostics

**Topics**
- Introduction to the function of Physical parts
- Function of Electronic boards
- Test points and procedure
- Mechanical Assembly / Disassembly
- Programming of software parameters
- Calibration setup manual (Auto calibration when available)
- Analog outputs, and Digital Inputs / Outputs
- Save / Load configuration functionality
- Spare parts

**Prerequisites**
Basic Knowledge of PGA Analysers would be helpful

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### Rosemount – X-Stream Gas Analyzer for Continuous Emissions Monitoring Systems (CEMS) – 2157

**Overview**
This 3-day course covers basic fundamentals and the theory of operation, installation, calibration and maintenance of Continuous Emissions Monitoring Systems (CEMS).

**Topics**
- Environmental Requirement
- Process Applications
- Theory of Operation
- Sample System Instrument
  - Installation and Troubleshooting
  - Hardware and Maintenance

**Audience**
This course is for instrument technicians responsible for the maintenance of continuous emissions monitoring systems.

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### Rosemount - MLT Continuous Gas Analyzer for Continuous Emissions Monitoring System (CEMS) – 2156
#### CEUs – 2.1

**Overview**
This 3-day Course combines lectures and hands-on labs to maximize the students understanding of the MLT Continuous Gas Analyzer.

**Topics**
- Environmental Requirements
- Process Applications
- Theory Operations
- Sample System Instrument
  - Installation and Troubleshooting
  - Hardware and Maintenance

**Audience**
Target Audience is intended, but not limited to, instrument technicians and engineers responsible for the maintenance of the MLT.

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### Rosemount – Analytical Oxygen/Combustion Flue Gas Analyzer OCX8800 Oxygen/Combustibles Analyzer – 2154
#### CEUs – 0.7

**Overview**
This 1-day course covers combustion measurement principles and the theory of operation for oxygen analyzers in general and the installation, operation, calibration and maintenance of the Rosemount OCX8800 Analyzers.

**Topics**
- Combustion Requirements
- Methods of Oxygen Analysis
- Typical Uses of Oxygen Analysis
- Combustion Efficiency
- Zirconia (ZrO2) Oxygen Analysis
- Theory of Operation
- Oxygen Analyzer
- COe Analyzer
  - Installation
  - Hardware
  - Maintenance
  - Troubleshooting
  - Hart Communications

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### Rosemount - Interactive Plant Environment General pH, Conductivity, and ORP Theory - 2800
#### CEUs – 1.4

**Overview**
This 2-day course combines lectures with bench-top labs and uses the interactive plant for scenario-based training. Target students are individuals responsible for the installation, configuration, calibration and maintenance of Rosemount Analytical pH, Conductivity, and ORP sensors and analyzers. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a "real world" plant environment.

**Topics**
- Identify Sensor Parts and Functionality
- Explain the Principles of Operation of pH, Conductivity, and ORP sensors
- Configure, Calibrate and Test Analyzers
- Properly Install and Troubleshoot pH, Conductivity, and ORP Sensors Along with Analyzers
- Students shall ensure proper PPE and safety measures while working on the plant.
Rosemount - X-Stream Process Gas Analyzers (PGA) – 2170
CEUs – 2.1

Overview
This 3-day course is a classroom training where students learn principles and practical operation of X2 analyzers. Through hands-on training, the student will learn on how to install, maintain, and troubleshoot the X2 analyzer. Using X2 Analyzer demo units students will:
- Understand the Photometric measurement principles such as the theory of Infrared and Ultraviolet Spectrometry, Paramagnetic and Thermal Conductivity
- Learn the signal processing of the electronic boards.
- Learn the test procedure for troubleshooting and diagnostics

Topics
- Introduction to the function of Physical parts
- Function of Electronic boards
- Test points and procedure
- Mechanical Assembly / Disassembly
- Programming of software parameters
- Calibration setup manual (Auto calibration when available)
- Analog outputs, and Digital Inputs / Outputs and Modbus setup
- Save / Load configuration functionality
- Spare parts
- Troubleshooting Procedure

Prerequisites
Basic Knowledge of PGA Analyzers would be helpful


Overview
This fully customized 5-day course provides students with a strong understanding of gas analyzer best practices as they relate to the safe operation and maintenance of the specific models of Rosemount Analytical Gas Analyzers found in their plants, including the NGA2000, MLT, Binos, CLD, X-STREAM, and X-STREAM XE. The instructor focuses on the specific analyzers that are applicable to the students’ specific needs. This course emphasizes safe handling of Rosemount Analytical analyzers. All necessary equipment and important handouts will be provided.

Topics
- Analyzer Overview, Including Hardware and Construction
- Software Functionality
- Physical Principals of IR and UV Photometric Measurements and Oxygen Paramagnetic Measurements
- Overview of the Electronics
- Replacement of Physical Components
- Testing and Troubleshooting
- Spare Parts
- Mechanical Assembly/Disassembly
- Sample Handling System – Method, Theory, and Troubleshooting
- Site-specific Applications
- Theory of Operation
- Installation and Start Up
- Troubleshooting and Maintenance
- Audit and Reporting Requirements

Prerequisites
Students that have at least 6 months experience with Emerson GC’s, just purchased an Emerson GC or are seeking a refresher course after having worked on their Emerson GC benefit most from this course. Candidates from non-technical backgrounds should consider taking R4100 Introduction to GC’s (for Model 500, 700 or 1000)

Rosemount - Operation & Maintenance - Gas Chromatographs of Model 500 - R4210
CEUs - 2.8

Overview
This 5-day course is appropriate for those who have either worked with a Gas Chromatograph for at least six months or completed the Introductory Gas Chromatograph course. It prepares participants to operate and repair a Model 500 Gas Chromatograph.

Topics
- Understanding Gas Chromatography and a Gas Chromatograph
- Using the Basic Chromatograph System in Process Gas Analysis
- Understanding Carrier and Calibration Gas Systems
- Installing and Operating MON Software
- Applying Chromatograph Integration Techniques and Post-Analysis Calculations
- Using the Chromatograph to Identify Problems
- Setting Timed Events, Retention Times, and Response Factors
- Starting Up a Gas Chromatograph
- Understanding Sample Handling Systems
- Verifying Proper Operation of a Gas Chromatograph
- Troubleshooting the 2350A Controller
- Configuring the 2350A Controller User Directory Outputs
- Conducting Preventative Maintenance
- Communicating to Other Devices
- Reviewing Spare Parts
- Recommendations

Prerequisites
Students that have at least 6 months experience with Emerson GC’s, just purchased an Emerson GC or are seeking a refresher course after having worked on their Emerson GC benefit most from this course. Candidates from non-technical backgrounds should consider taking R4100 Introduction to GC’s (for Model 500, 700 or 1000)
### Rosemount - Gas Chromatographs - Introduction, Model 700XA & 1500XA - R4105 CEUs - 2.1

**Overview**
This 3-day course gives students basic understanding of how Rosemount Analytical gas chromatographs 700XA & 1500XA (formerly Danalyzer GCs) work, emphasizing chromatograph fundamentals and basic theory.

**Topics**
- Reviewing Chromatography Principles
- Understanding Chemistry, Flow Configuration, and Gas Systems
- Reviewing Sample Systems
- Working with Chromatograph Hardware
- Setting Timed Events, Retention Times, and Response Factors
- Understanding Data Calculations
- Reading Chromatograms
- Calibrating a Gas Chromatograph

Classes typically start at 8AM CST on Tuesday and end at 5PM CST on Thursday to accommodate travel.

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### Rosemount - Analytical 370XA Gas Chromatograph - Operation & Maintenance - R4170 CEUs - 2.1

**Overview**
This 3-day training is a level 1 course and includes theory, operations and maintenance practices for the Rosemount Analytical 370XA Gas Chromatograph (formerly Danalyzer GC). Module overview hardware and software overview as well as basic troubleshooting skills.

**Topics**
- Chromatographic Theory
- Detector Theory
- Understanding Chromatograms
- Startup Procedures
- Natural Gas Sample Handling
- Using 370XA Software Assistants
- Cal-Saver™
- Running Auto Valve Timing
- Module Initializations
- Calibrations, Validation & Routine Maintenance (Valve Rebuilding)
- Troubleshooting the module
- 370XA Hardware
- MON2020 Software

**Prerequisite**
E4070 Introduction to the Model 370XA.

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### Rosemount - Operation & Maintenance - Model 700 Gas Chromatograph - R4212 CEUs – 2.8

**Overview**
This 5-day course is appropriate for those who have either worked with a chromatograph for at least six months or completed the Introductory Gas Chromatograph course. It prepares participants to operate and repair a Rosemount Analytical 700 Gas Chromatograph. It prepares participants to operate and repair a Model 700 gas chromatograph.

**Topics**
- Understanding Gas Chromatography and Gas Chromatographs
- Using the Basic Chromatograph System in Process Gas Analysis
- Understanding Carrier and Calibration Gas Systems
- Installing and Operating MON Software
- Applying Chromatograph Integration Techniques and Post-Analysis Calculations
- Using the Chromatograph to Identify Problems
- Setting Timed Events, Retention Times, and Response Factors
- Starting Up a Gas Chromatograph
- Understanding Sample Handling Systems
- Verifying Proper Operation of the Gas Chromatograph
- Conducting Preventative Maintenance
- Communicating to Other Devices

**Prerequisites**
Students that have at least 6 months experience with Emerson GC's, just purchased an Emerson GC or are seeking a refresher course after having worked on their Emerson GC benefit most from this course. Candidates from non-technical backgrounds should consider taking R4100 Introduction to GC’s (for Model 500, 700 or 1000).
Overview
This 5-day course is appropriate for those who have either worked with a GC for at least six months or completed the introductory gas chromatograph course. It prepares participants to operate and repair a Rosemount Analytical 700XA & 1500XA Gas Chromatograph.

Topics
- Understanding Gas Chromatography and Gas Chromatographs
- Using the Basic Chromatograph System in Process Gas Analysis
- Understanding Carrier and Calibration Gas Systems
- Installing and Operating MON Software
- Applying Chromatograph Integration Techniques and Post-Analysis Calculations
- Using the Chromatograph to Identify Problems
- Setting Timed Events, Retention Times, and Response Factors
- Starting Up a Gas Chromatograph
- Understanding Sample Handling Systems
- Verifying Proper Operation of the Gas Chromatograph
- Conducting Preventative Maintenance
- Communicating to Other Devices
- Reviewing Spare Parts Recommendations

Audience
This course is best suited for students working in a technical environment.

Prerequisites
Students that have at least 6 months experience with Emerson GC’s, just purchased an Emerson GC or are seeking a refresher course after having worked on their Emerson GC benefit most from this course. Candidates from non-technical backgrounds should consider taking R4105 Introduction to GC’s (for 700XA/1500XA).

Overview
The 5-day course covers the theoretical and practical aspects of the flame Photometric Module (FPD) used with the model 500, 700 and 700XA. It does not cover any aspect of the theory of the model 500, 700 or 700XA neither does it cover the menus and use of MON2000/ MON2020. The course concentrates on practical work. The course is aimed at those who will be carrying out maintenance on the FPD module.

Topics
- Sulphur
- FPD Theory and Maintenance
- Applications
- Dismantling and Rebuilding a Flame Cell Replacing all the “O” Rings
- Removing/Installing the Flame Cell and Photomultiplier into the FPD Module
- Setting Up the Hydrogen/Air Ratio to Achieve Continuous Combustion
- Adjusting the Entry of the sample into the Flame Cell
- Setting Up the Flame Out Circuit
- Adjusting the Amplifier to Optimize Peak Amplitude
- FPD Chromatograms
- Routine Maintenance
- Fault Finding

Prerequisites
Students attending this course must have completed either of these Operations & Maintenance courses: R4210, R4212, or R4213/R4214.

Overview
This 5-day course is most valuable to those with three years of chromatography experience, or those who have completed the introductory ‘Operation and Maintenance of Gas Chromatographs’ course. Participants will develop an advanced understanding of gas chromatograph operation, troubleshooting, and maintenance. Training becomes customized when students present application information. Given that data, the experienced instructor will look closely at specific applications and offer participants insight.

Topics
- Understanding Chromatograph Flow Configurations
- Overhauling Valves
- Reviewing Thermal Conductivity, Flame Ionization, and Flame Photometric Detectors
- Understanding Sample/Carrier/Calibration Gas Systems
- Working with and troubleshooting the Rosemount Analytical 2350A Controller
- Installing and Using MON Software for Integration and Calibration
- Setting Timed Events, Retention Times, and Response Factor Calculations
- Understanding Startup Procedures
- Setting Valve Timing and Flows with Different Flow Configurations
- Checking for Proper Separation and Analyzing Gas Chromatographs
- Verifying Proper Operation of the Gas Chromatograph
- Troubleshooting the Chromatograph and 2350A Controller
- Configuring Reporting Details and Control Outputs
- Conducting Preventative Maintenance
- Communicating to Other Devices
- Reviewing Spare Parts Recommendations

Prerequisites
Students attending this course must have completed either of these Operations & Maintenance courses: R4210, R4212, or have 3 years of advanced chromatography experience.
Overview
This 5-day course equips students with a full understanding of many advanced techniques used in process gas chromatography. An experienced instructor and focused material enable students to troubleshoot a variety of field issues for the Rosemount Analytical 700XA & 1500XAGC.

Topics
- Setting Valve Timing
- Hardware Troubleshooting
- Mixture Adjustments for FID
- Mixture Adjustment for FPD
- Verifying proper operation of the Gas Chromatograph
- Overview of Model 1500XA
- Liquid Sample Injection
- Review of Sample System
- Techniques
- Calibration and Accuracy Checks
- Recovery of GC After Analysis
- Interruption
- GC Start-up After Overhaul
- Communicating to Other Devices
- Understanding flow settings for various flow configurations
- Understanding when to overhaul valves

Prerequisite
Students attending this course must have completed either of Operations & Maintenance course R4213/R4214 or have 3 years of advanced chromatography experience.

Rosemount - Four-Wire Liquid Analyzers - 56, 1056, & 1057 – 2204
CEUs - 0.2

Overview
This 2-hour class covers features, benefits and operation of Rosemount Analytical Models 56, 1056 or 1057. Each analyzer family can measure pH, ORP, contacting conductivity, toroidal conductivity, chlorine, oxygen, and ozone. The Model 1056 can also measure Turbidity in drinking water, flow from a pulse sensor and display any 4 to 20mA signal input. Each instrument has its own available features, and menu tree which will be covered in detail.

Topics
- Installation and Application Problems
- Configuration of Outputs / Alarms (If Applicable)
- Programming of Automated Cleaning Systems (DO, pH)
- Use Diagnostic Features (If Applicable)
- Sensor Calibration
- Troubleshooting

CEUs - 0.7

Overview
This 1-day course provides a solid theoretical background in pH, Conductivity, and ORP measurements. Students who complete this course will be able to:
- Understand how each measurement is made
- Recognize installation/application problems
- Configure and calibrate instruments
- Implement a maintenance program
- Troubleshoot problems using diagnostics

Topics
- What is pH/Conductivity/ORP
- How pH/Conductivity/ORP Measurements are Made
- Physical Process Properties and How They Effect On-Line Measurements
- Proper Calibration Techniques
- Cleaning and Maintenance of a Sensor
- Choosing Correct Sensor for Any Process
- How to Decipher Diagnostics Readouts
- pH/Conductivity Sensor Overview
- pH/Conductivity/ORP Analyzer Overview

Rosemount - Dual Input Analyzer - 1056 - e2601
CEUs - 0.10

Overview
Introduction to the 1056 Dual Input Analyzer, including overview of functions, mechanical and electronic installation, adding sensor boards and wiring sensors, and using the interface. Basic installation, configuration and calibration training in the 1056 Analyzer.

Rosemount - pH Theory - Level 1 - e2602
CEUs - 0.1

Overview
Entry level training in pH Theory, including explanation of pH measurement, industries utilizing measurement, types of pH measurement, science of determining pH, and examination of a pH detector and sensor. Explain pH to learner to impart a solid, working knowledge of pH and how it is measured and why, in industry, and understanding of pH scale, and pH sensors.

Rosemount - Liquid Analysis: Chlorine, Dissolved Oxygen & Ozone
Amperometric Measurement Theory – 2201
CEUs - 0.7

Overview
This 1-day course provides insight into the complicated amperometric measurements of chlorine, dissolved oxygen and ozone. Students will learn the concepts of how amperometric sensors work and how to calibrate each type of measurement. Students who complete this course will be able to:
- Understand the theory behind how amperometric sensors work and how to calibrate each type of measurement
- Differentiate the various species of chlorine
- Implement a proper maintenance program
- Use diagnostics to troubleshoot problems

Topics
- Amperometric Measurement Theory:
  - Chlorine/Dissolved Oxygen/Ozone
- Calibration Procedures for Each Measurement
- Maintenance & Troubleshooting Tips

Rosemount - Liquid Analysis: Measurement Theory (Customer Specific) – 2205
CEUs - 0.7

Overview
This 7-hour class is fully customized to cover the specific measurements that the customer requests. A certified trainer will cover up to 4 subjects in one day. The 4 subjects may be measurement or product related. The list of measurements that can be bundled into a tailored made training course are pH, ORP, contacting conductivity, toroidal conductivity, turbidity, chlorine, dissolved oxygen, and ozone. Each measurement theory has its own duration which can be modified to fit the customers' time frame needs. Select an analyzer (course 2204) or transmitter (course 2202) to accompany the measurement theories for a well-rounded class.

Topics
- Installation and Application Problems
- Configuration of Outputs / Alarms (If applicable)
- Use Diagnostic Features (If Applicable)
- Sensor Calibration & Maintenance
- Troubleshooting
**Roxar - Acoustic Sand Monitor - RX007**  
**CEUs - 1.2**

**Overview**  
The Roxar Sand Monitor is a non-intrusive acoustic sand monitoring system that identifies in real-time sand production in any water, oil, gas or multiphase flow lines for onshore and offshore locations. This 1-day training course focuses on teaching the participants what valid and non-valid data are; provides knowledge on how to create reports from data received by the instrument in order to provide input to integrity managers to enable better decision-making. The course is available in two versions: SAM Server and Fieldwatch, depending on the system soft-ware that your installation is using to operate the instrumentation.

**Topics**  
- Introduction to Sand Metering  
  - Causes of Sand Production  
  - Why Do we Need Sand Detection System?  
  - Roxar Sand and Pig Detection System  
  - System Enclosure, History; Challenge, Integration with Other Products  
- Measurement Technology  
  - How Do We Measure – Sand Interface  
  - Sand Rate Calculation - Sand Detector  
  - Product Optimization  
- Operations  
  - Software and General Set-Up; - System Overview  
  - Configure Sensor Parameters  
  - Process Data Interface: Flow Rate Input, Velocity Input, Choke Input, Well Test Data Interface  
  - Alarm Settings Interface, Data Logging  
  - Basic Interpretation: Basic Noise Estimation, Sand Production Estimation  
  - Adv. Interpretation: Velocity in Signal Interpretation  
  - Flow Regime Consideration  

**Roxar - Acoustic Sand Monitor - RX007 – Continued...**  
- Maintenance  
  - Detector Installation: Locations on Pipe, Temperature Considerations; - Wiring  
  - Communication Digital Output, Analogue Output, Volt Free Contact, Lamp Output  
  - Calibration: Factory Calibration, Background Noise Calibration, Automatic Background Noise Curve (ABA), Sand Noise Calibration  
  - Sand Transport Capability Indicator  
  - Sand Mass Correction (L)  
  - Choke Calibration  
  - Filtering Settings: Alpha and Beta Filtering of Raw Data, K-Factor  
  - Preventative Maintenance: Visual Inspection and Routine Testing  
  - Calibration Adjustment: Background Noise Calibration (Zero Calibration)  
  - Sand Calibration, Hardware Maintenance: Checking Sensor Connections, Reinstalling or Replacing the Detector

**Roxar - CorrLog - Intrusive Corrosion Monitoring System - ROX008**  
**CEUs - 1.2**

**Overview**  
Our intrusive corrosion monitor 1-day training course will provide your personnel with the knowledge of the Roxar intrusive corrosion monitoring system, providing understanding of the different system infrastructures, components and measurement principles. The course focuses on teaching the participants what valid and non-valid data are; provides knowledge on how to create reports from data received by the instrument in order to provide input to integrity managers to enable better decision-making. The course is available in two versions: MultiTrend and Fieldwatch, depending on the system software that your installation is using for operations of the instrumentation.

**Topics**  
- Introduction to Corrosion Monitoring  
  - Overview of Corrosion Issues  
  - Why Corrosion Monitoring?  
  - Corrosion Control and Process Optimization  

**Roxar - CorrLog - Intrusive Corrosion Monitoring System - ROX008 – Continued...**  
- Integrity Management and Safety  
  - Basic Principles for Selecting Locations for Corrosion Monitoring  
- Overview of the Roxar Intrusive Corrosion Monitoring System  
- Weight Loss Coupons, Electrical Resistance Probes, Linear Polarization Probes, Galvanic Probes  
- Mechanical Accessories  
  - Instrumentation  
  - System Software  
  - Integrated Flow Assurance Monitoring Systems  
- Measurement Principles  
  - Weight Loss Coupons  
  - Electrical Resistance Probes  
  - Linear Polarization Probes  
  - Galvanic Probes  
- Software Operations  
  - Verification of the Software  
  - Configuration and Installation Architecture  
  - Instrument Specific Parameters  
  - Raw Data Verification  
  - Engineer Values  
- Data Handling and Presentation  
- Data Interpretation  
- Reporting  
  - Exporting Data  
  - Maintenance  
  - Battery Replacement (Offline Systems Only)  
  - System Health Check  
  - Replacing Interface Cards
Roxar - FSM - ROX010
CEUs - 1.2

Overview
Corrosion is a major cost in the oil and gas as well as other industries, and frequently being the reason for accidents and unplanned interruptions in production plans. Corrosion monitoring is thus important for verification of the assets integrity. Roxar's FSM (Field Signature Method) system is a non-intrusive system for monitoring internal corrosion in pipes, pipelines or vessels directly in the pipe wall. Our Non-Intrusive Corrosion Monitor 2-day training course will provide your personnel with the knowledge of the Roxar non-intrusive corrosion monitoring system, understanding of the different system infrastructures, components and measurement principles. The course focuses on teaching the participants what valid and non-valid data are; provides knowledge on how to create reports from data received by the instrument in order to provide input to integrity managers to enable better decision making. The course is available in two versions: MultiTrend and Fieldwatch, depending on the system software that your installation is using for operations of the instrumentation.

Topics
- Introduction
  - Overview of Corrosion Issues
  - Why Corrosion Monitoring?
- Corrosion Control and Process Optimization
- Integrity Management and Safety
  - Basic Principles for Selecting Locations for Corrosion Monitoring
  - Overview of the Roxar FSM System
- Mechanical Components
- Buried System
  - Instrumentation
  - System Software
  - System Infrastructure
  - Integrated Flow Assurance Monitoring Systems
- Measurement Principles
  - Field Signature Method
- Software Operations
  - Verification of the Software
  - Configuration and Installation Architecture
  - Instrument Specific Parameters
  - Raw Data Verification
  - Signature
  - Engineering Values
- Data Handling and Presentation
- Data Interpretation
- Reporting
  - Exporting Data

Roxar - FSM - ROX010 – Continued…
- Maintenance
  - Battery Replacement (EX Version)
  - System Health Checks

Roxar - Hydraulic Retrieval & Access Fitting System - ROX011
CEUs - 1.8

Overview
The objective of this course is to give the participant an overview of the Hydraulic Retrieval & Access Fitting System. The focus of this 1-day course is to bring awareness of working safely and efficiently with the tool and safe work practices. It will explain the design and operations of the tool and the fitting, and is recommended for anyone who will work with retrieval operations using our hydraulic retrieval system. Physical demonstrations with retrievers, service valves, and retractors on non-pressurized stands may be arranged by special request.

Topics
- Introduction
  - The Hydraulic Access Fitting and its Components
  - The Hydraulic Tool Retrieval and its Components
  - Different Variations of the Tool (PED/Non-PED)
- Theoretical Operation
  - Videos
  - Theoretical Run through the Operation
  - Understanding How the Tool Works
  - Safe Operation of the Tool
  - Troubleshooting and Maintenance
- Practical Operation
  - Practical Troubleshooting
  - Focus on Getting Comfortable using the Tool
  - Repeated Operations
  - Maintenance After Use
  - Practical Exam

Roxar - Multiphase Meter 1900VI ROX001
CEUs - 1.8

Overview
The Roxar topside Multiphase meter measures accurately the flow rates of oil, gas and water without separation, mixing or moving parts. Field experience shows long-term stability, high accuracy and very good repeatability. The objective of the 3-day Roxar MPFM 1900VI course is to provide the participant with an understanding of the multiphase flow, components and measurement principles of the instrument. The course focuses on providing the participants with detailed understanding of the set-up and configuration; calibration data, reference fluid parameter set-up and operation of the meter. The course will cover interpretation and correlation of MPFM parameters versus influences of process conditions.

Topics
- Introduction to Multiphase
- Metering of Oil & Gas Production
- Purpose of the Roxar Multiphase Meter
- Multiphase Flow and Terminology
- Roxar Multiphase Sensors and Electronics
- Measurement Technology
  - Overview of the Measurement System
  - Measurement Principles used in Roxar MPFM 1900VI
  - Determination of Flow Rates
  - Velocity Measurements: Pressure, Temperature & Volume
  - Verification of the Measurements - which Factors have Vital Importance for Design and Process Calculation
- Operations
  - Overview of Roxar MPFM 1900VI Operation System
    - Service Console Software Installation and Main Screen Presentations
    - Communication Set-Up
    - Calibration and Reference Fluid Parameter Set-Up
    - Purpose of the Service Console Program (SCP)
      - Interpretation of the SCP screen — Diagnostics
      - SCP Screen Alarm Indication, Configuration of the Multiphase Meter
    - Practical Information on How to Access and Save Parameter Files;
    - Practical Information on How to Log and Retrieve Data; Well Test Options
Roxar - Multiphase Meter 1900VI ROX001 – Continued...

- Maintenance
  - Test Equipment and Recommended Spare Parts
  - Main Checks and Intervals
  - Radiological survey (Topside)
  - Reference Fluid Density Parameter Set-Up
  - Reference Permittivity and Conductivity
- Temperature, Pressure and Differential Pressure Function Check
- Capacitance Unit Function Check
- Inductive Unit Function Check
- Densimeter Unit Function Check

Roxar - Multiphase Meter 2600 - ROX002 CEUs - 1.8

Overview
The Roxar Zector technology provides accurate and real-time characterization of flow patterns. The voxel-based signal processing and electrode geometry provides information, including multiple flow velocity data and near wall measurements. The objective of the Roxar MPFM2600 2-day course is to provide the participant with an understanding of the multiphase flow, components and measurement principles of the instrument. The course focuses on providing the participants with detailed understanding of the set up and configuration; calibration data, reference fluid parameter set up and operation of the meter. The course will cover interpretation and correlation of MPFM parameters versus influences of process conditions. Understanding the data is the key in order to make the right decisions for reservoir management.

Topics
- Introduction to Multiphase Metering
  - Single Phase Metering/Multiphase Metering
  - Flow Regimes
  - Roxar’s Experience in Multiphase Metering
  - Roxar MPFM2600
  - Mechanical Design
  - Mechanical Specifications
  - Installation and Commissioning Instructions
  - Measurement Technology
  - Overview of the Measurement System

Roxar - Multiphase Meter 2600 - ROX002 – Continued...

- The Principle of Operation (Phase Fraction Measurement, the Gamma Densitometer, Velocity Measurement, PVT Tables, Phase Slip, Static Properties)
- Software Operations
  - Overview of Roxar MPFM Operation System
  - Installation and Start Up of the Service Console

Software Operations: Practical Information on How to Access and Save Parameter Files, Logging and Retrieving data, Well Test Options
- Maintenance
  - Overview of the Mechanical System Maintenance
  - Gamma System
  - Electrical System
  - Calibration
  - Replacement of Parts
- PVT
  - What is PVTx
  - Fluid Analysis: Sampling, Compositional Data
  - Tempest PVTx
  - Import Tables
  - Parameter Save and Download; Diagnostics; Troubleshooting

Roxar - SandLog Intrusive Sand Monitoring System - ROX009 CEUs - 1.2

Overview
Our intrusive sand monitor 1-day training course will provide your personnel with the knowledge of the Roxar Sand Monitoring System, providing understanding of the different system infrastructures components and measurement principles. The course focuses on teaching the participants what valid and non-valid data is; provides knowledge on how to create reports from data received by the instrument in order to provide input to integrity managers to enable better decision making. The course is available in two versions: MultiTrend & Fieldwatch, depending on the system software that your installation is using for operations of the instrumentation.

Topics
- Introduction to Intrusive Sand Metering
  - Overview of Sand/Erosion Issues
  - Basic Principles for Selection Locations for Sand/ Erosion Monitoring

Roxar - SandLog Intrusive Sand Monitoring System - ROX009 – Continued...

- Erosion Control Integrity & Safety
- Optimizing Flow Rates & Production
- Overview of the Roxar Intrusive Sand/Erosion Monitoring System
- Mechanical Accessories
  - Sand Erosion Probes
  - Combined Sand Erosion & Corrosion Probe
  - Electrical Resistance Probes
  - Instrumentation
  - System Software
  - Integrated Flow Assurance Monitoring Systems
- Measurement Principles
  - Electrical Resistance Probes
  - Sand Erosion Measurements
  - Correlations with Sand Production
  - Combined Sand Erosion and Corrosion Probe
- Software Operations
  - Verification of the Software
  - Configuration & Installation Architecture
  - Instrument Specific Parameters
  - Raw Data Verification
  - Engineer Values
  - Data Handling and Presentation
  - Data Interpretation
  - Reporting
  - Exporting Data
- Maintenance
  - Battery Replacement (Offline Systems Only)
  - System Health Check
  - Replacing Interface Cards
### Roxar - Subsea Multiphase Meter - ROX003
**CEUs - 1.8**

**Overview**
The Roxar subsea Multiphase meter provides flow rates for oil, gas and water; vital information for managing reservoirs and processes. The objective of the Roxar SMPFM 2-day course is to provide the participant with an understanding of the multiphase flow, components and measurement principles of the instrument. The objective of the Roxar Subsea Multiphase Meter course is to provide the participant with an understanding of the multiphase flow, components and measurement principles of the instrument. The course focuses on providing the participants with detailed understanding of the set up and configuration; calibration data, reference fluid parameter set up and operation of the meter. The course will cover interpretation and correlation of SMPFM parameters versus influences of process conditions. Understanding the data is the key in order to make the right decisions for reservoir management.

**Topics**
- Introduction to Multiphase Metering
  - Single Phase Metering/Multiphase Metering
  - Flow Regimes
  - Roxar’s Experience in Multiphase Metering
  - Roxar SMPFM
  - Well Testing, Monitoring and Allocation
- Mechanical Specifications
  - Roxar SMPFM Components
  - Versions of the Meter
- Measurement Technology
  - Overview of the Measurement System
  - The Principle of Operation (Phase Fraction Measurement, the Gamma Densitometer, Velocity Measurement, PVT Tables, Phase Slip, Static Properties)
- Software Operations
  - Overview of Roxar SMPFM operation system
  - Installation and Start-Up of the Service Console
  - Software Operations: Practical Information on How to Access and Save Parameter Files, Logging and Retrieving Data, Well Test Options
  - Well Test
  - Creating Diagnostic Files
  - Setting Up Fluid Parameters

### Roxar - Subsea Multiphase Meter - ROX003 – Continued...

- Maintenance
  - Gamma System
  - Electrical System
  - Calibration
  - Software Updates
  - Sensor Geometry
- PVT
  - What is PVTx
  - Fluid Analysis: Sampling, Compositional Data
  - Tempest PVTx
  - Import Tables

### Roxar - Subsea Watercut Meter - ROX006
**CEUs - 1.2**

**Overview**
The Roxar Watercut meter measures water in oil (0% to 100%) and is used in process control on test separators, fiscal metering, on- and offloading, export metering, desalting in refineries, two phase flow metering. The Roxar Watercut meter uses a unique and patented microwave resonance technology to measure the permittivity of an oil/water mixture with an extremely high level of accuracy and sensitivity. The aim of this 1-day course is to enable participants to take full advantage of the meter in real applications. Upon completion of the course participants should be able to efficiently run the instrument on their own, including delivering on-site quality reliable data, doing normal routine maintenance, fault finding and troubleshooting.

**Topics**
- Introduction to Water Cut Metering and Technology
  - Why Measure Water Cut?
  - Water Cut Metering Challenges
  - Water Cut Metering Requirements
  - Technology for Water Cut Measurement
- Measurement Technology
  - How Do We Measure Water Cut
  - Installation
  - Microwave Signal Path
  - Entrapment of Microwaves in a Pipe
  - Microwave Resonance
  - Permittivity of Oil and Water
  - Water Continuous and Oil Continuous Phase
  - The Tables of Water Cut Made from the First Meter

### Roxar - Subsea Watercut Meter - ROX006 – Continued...

- The Production of the Meters to Fit the Model of the First Meter
- The Production Sequence in a Meter
- Measurement Uncertainty and Initial Explanation
- Operations
  - Connecting to the Meter
  - Software Operations: Entering the Meter, Configuration
  - Measurement
  - Inline Calibration of the Meter
  - Measurement Uncertainty
  - Practical Exercises on Meter Electronics
- Maintenance
  - Overview of Recommended Maintenance
  - Turning Diagnostics and Logging of Hyper Terminal
  - Taking a 50dB Plot of Microwave Electronics
  - Common Error Messages
  - Sending Diagnostic Data to Roxar for Analysis and Filing
  - Download New Code for a Meter
  - Erasing Battery Backed RAM in a Meter
  - Troubleshooting the Temperature Transmitter
  - Practical Exercises
Roxar - Subsea Wetgas Meter - ROX005
CEUs - 1.2

Overview
The Roxar Subsea Wetgas meter is a unique instrument allowing accurate measurement of hydrocarbon flow rates and water production with a very compact mechanical solution. The aim of this 1-day training is to provide the participants with in-depth knowledge of instrument operations which enable participants to take full advantage of the meter in real applications. Course participants will be taught the intricacies of the meter and measurement technology, understanding of the data and the measurement principles will allow better decision making when it comes to reservoir management and optimizing the production process.

Topics
- Introduction to Wetgas
  - Introduction
  - Wet Gas
  - Why Measure Water?
- Multiphase Flow
- Flow Conditions
- Ranges and Specifications
- Installation Examples

- Mechanical Specifications
  - Material Overview
  - Design Standards
  - SWGM Components
  - Cathodic Protection and HISC
  - Insulation and Coating
  - Testing

- Measurement Technology
  - Overview of the Measurement System
  - The Principle of Operation
- Direct Measurement and Required Inputs
- Fraction Calculations
- Formation Water Detection
- Calculation Modes
- Redundancy

- Operations and Maintenance
  - Pre-commissioning Phases
  - Commissioning and Start Up
  - Communication
  - Roxar SWGM Console
  - Meter Operation
  - Alarms and Warnings
  - Calibration (Describe All Alternatives)
  - Maintenance

Roxar - Wetgas Meter - ROX004
CEUs - 1.2

Overview
The Roxar Wetgas Meter is a unique instrument allowing accurate measurement of hydrocarbon flow rates and water production, with a very compact mechanical solution. The aim of this 1-day training is to provide the participants with in-depth knowledge of instrument operation, which enables participants to take full advantage of the meter in real applications. Course participants will be taught the intricacies of the meter and measurement technology, understanding of the data and the measurement principles will allow better decision making when it comes to reservoir management and optimizing the production process.

Topics
- Introduction to Wetgas
  - Introduction
  - Wet Gas
  - Why Measure Water?
- Multiphase Flow
- Flow Conditions
- Ranges and Specifications
- Installation Examples

- Mechanical Specifications
  - Material Overview
  - Design Standards
  - WGM Components
  - Cathodic Protection and HISC
  - Insulation and Coating
  - Testing

- Measurement Technology
  - Overview of the Measurement System
  - The Principle of Operation
- Direct Measurement and Required Inputs
- Fraction Calculations
- Formation Water Detection
- Calculation Modes
- Redundancy

- Operations and Maintenance
  - Pre-Commissioning Phases
  - Commissioning and Start Up
  - Communication
  - Roxar WGM Console
  - Meter Operation
  - Alarms and Warnings
  - Calibration (Describe All Alternatives)
  - Maintenance

Roxar - Fieldwatch - ROX012
CEU – 0.7

Overview
Roxar Fieldwatch enables the intelligent oilfield and helps the users to improve work processes, optimize production and in the end maximize reservoir recovery. Roxar Fieldwatch collects, monitors, visualizes and analyzes data from a range of sensors and instruments to provide operators with a complete picture of the reservoir and the production system. It also provides data input to reservoir and production engineers when they make reservoir management decisions relating to metering, production allocation or choke settings. The end result is a more intelligent reservoir and increased production. Give participants an overview of the software, ensuring users are familiar with navigation of the software and menus.

Roxar – Multiphase Meter – 2600 – Module 1 – ROX013
CEUs – 0

Overview
This 1-day training course provides the participants with an understanding of the multiphase flow, components and measurement principles of the instrument. Upon completion of the course participants should have a good understanding of the theoretics of the Roxar 2600 MPFM including multiphase flow, components and measurement principles of the instrument.

For hands on training please refer to courses ROX014 and ROX015.

Topics
- Introduction to Multiphase Flow
- Introduction to Multiphase Metering
- Typical Installations and applications
- Mechanical Design
- Installation requirements
- Measurement Technology
- Measurement Uncertainty
- Communication

Audience
Technicians, Operators, Maintenance personnel

Prerequisites
Some experience with instrumentation would be helpful. In order to gain the maximum benefit of the course we recommend that each participant gets acquainted with Handbook of Multiphase Metering available for download on www.nfogm.no (under documents section) or completes an online course on the same website under NFOGM Metering School.
Roxar – Multiphase Meter – 2600 – Module 2 – ROX014
CEUs – 0

Overview
This 3-day training ensures your instrument technicians and engineers know how to correctly install, configure, startup and troubleshoot your Roxar 2600 MPFM.

We offer in-depth product training either at a local Emerson office, at business locations in your area or at your own site.

The Roxar 2600 MPFM training will enable you to:
• Properly install meters according to specifications
• Commission and start-up new meters
• Troubleshoot meter problems

Topics
• System Overview
• Installation of Service Console
• Main Screen
• File handling
• View
• Options
• Fluid
• Configuration of data logging
• Service Menu on the Service Console
• Alarm recognition and Troubleshooting
• PVTx
• Installation of meter into pipeline
• Pressure test & drainage
• Verification of Mechanical design
• Gamma source installation & calibration
• Wiring & Grounding
• Commissioning
• Fluid Sampling
• Validation of start-up data
• Communication through the SCADA network
• Voltage checks
• Configuration of data logging

Audience
Technicians, engineers

Prerequisites
Completion of Module 1 ROX013 is required to attend the training

Roxar – Multiphase Meter – 2600 – Module 3 – ROX015
CEUs – 0

Overview
This 2-day training ensures your instrument technicians and engineers know how to improve reliability of the MPFM and get an overview of required maintenance activities. Our certified Instructors share their valuable experience from working in field and lead students through extensive hands-on exercises using the latest configuration tools. This maximizes the training effectiveness and enables attendees to quickly apply their new skills and knowledge in their job.

We offer in-depth product training either at a local Emerson office, at business locations in your area or at your own site.

The Roxar 2600 MPFM training will enable you to:
• Improve instrument lifecycle
• Reduce downtime and cost
• Increase reliability and availability

Topics
• Visual inspection
• Verification of valves opening
• Declogging of MVT pressure lines
• Maintenance on electronics enclosure
• Communication status
• Flow computer SW upgrade
• Configuration of data logging
• Radiation Level Check
• Gamma System Calibration
• Zero point calibration of DP & P Transmitters
• Well test verification
• Replacement of Flow Computer parts
• Replacement of parts
  - Field Electronics
  - Gamma system
  - Temperature sensor
  - Venturi
  - Replacement of wiring
• Meter cleaning
• Re-commissioning of meter upon relocation

Audience
Technicians, engineers

Prerequisites
Completion of Module 1 ROX013 and Module 2 ROX014 is required to attend the training

Roxar - Multiphase Meter - 2600 - ROX016
CEUs – 0

Overview
The objective of the Roxar MPFM2600 2-day course is to provide the participant with an understanding of the Roxar 2600 multiphase meter components and measurement principles. The course focuses on providing the participants with detailed understanding of the set up and configuration; calibration data, reference fluid parameter set up and operation of the meter. The course will cover interpretation and correlation of MPFM parameters versus influences of process conditions. Understanding the data is the key in order to make the right decisions for reservoir management. (This training course includes Hands on Training with an offline actual meter).

Topics
• Introduction to Multiphase Metering
• Single Phase Metering/Multiphase Metering
• Flow Regimes
• Roxar’s Experience in Multiphase Metering
• Roxar MPFM2600
• Mechanical Design
• Mechanical Specifications
• Installation and Commissioning Instructions
• Measurement Technology
• Overview of the Measurement System
• The Principle of Operation (Phase Fraction Measurement, the Gamma Densitometer, Velocity Measurement, PVT Tables, Phase Slip, Static Properties)
• Software Operations
• Overview of Roxar MPFM Operation System
• Installation and Start Up of the Service Console
• Software Operations: Practical Information on How to Access and Save Parameter Files, Logging and Retrieving data, Well Test Options
• Maintenance
• Overview of the Mechanical System
• Gamma System
• Electrical System
• Calibration
• Replacement of Parts
• PVT
• What is PVTx
• Fluid Analysis: Sampling, Compositional Data
• Tempest PVTx
• Import Tables
• Parameter Save and Download; Diagnostics; Troubleshooting

Audience
Technical personnel operationally involved with Roxar Multiphase Flow Meters.

Prerequisites
Some experience with instrumentation would be helpful. In order to gain the maximum benefit of the course we recommend that each participant gets acquainted with Handbook of Multiphase
| **RS3 - Introduction – 3100**<br>**CEUs - 3.5** | **Overview**<br>This curriculum provides a starting point for all engineers, technicians and other personnel who will configure, install, or maintain any part of a RS3 Distributed Control System. It may meet all the needs of those configuring control systems for continuous processes requiring nothing more complex than cascade or ratio control, simple interlocks or motor controls. For others, 3100 modules serve as prerequisites for modules in the 3200, 3500 or 3600 curricula. This curriculum can provide a basic understanding of RS3 for managers and others whose success depends on the system but who will not work with it directly. | **RS3 - Process Operation – 3400 – Continued...**<br>through repetition of routine procedures under increasingly challenging conditions. Qualification exercises require each student to demonstrate an adequate skill level before proceeding to the next training activity or module. | **Topics**<br>- 3100-1 Developing Basic Operating Skills Using the RS3 MTCC Console<br>- 3100-2 System Hardware and Architecture<br>- 3100-3 Configuring Basic Control Loops<br>- 3100-4 Configuring Trends, Reports, Alarms/Console Configuration- RS3 MTCC Console<br>- 3100-5 Configuring Logic Functions/Displays<br>- 3100-6 Configuring Process Graphic Displays Using the RS3 MTCC Console<br>- 3100-7 Configuring Cascade/Ratio Loops | **Topics**<br>- 3400-1 Basic Operating Displays and Adjustments Using the MTCC Console<br>- 3400-2 Operating Cascade and Ratio Loops Using the MTCC Console<br>- 3400-4 Operating Batch Processes Using ABC Batch Software through the MTCC Console (Batch Only!) | **Audience**<br>The 3400 curriculum is designed for plant operators and supervisors who are responsible for day-to-day process operation. |
| **RS3 - Process Operation – 3400**<br>**CEUs - 1.8** | **Overview**<br>Training can be tailored to either a continuous or a batch process. The 3400 modules help the student learn how to analyze process conditions and make process adjustments, with confidence and without hesitation. Training activities help the student develop keyboard dexterity |  |  | **Audience**<br>The 3600 modules are designed for engineers who must configure/support a batch process control system using RS3 ABC Batch software. | **Prerequisite**<br>Curriculum 3100, Introduction to RS3 |
| **RS3 - Hardware & Maintenance – 3200**<br>**CEUs - 3.5** | **Overview**<br>Students entering this curriculum should have a general electronics background, and should know how to use electronics test equipment such as a multimeter & current source. |  |  |  | **Audience**<br>The 3200 curriculum is designed for technicians and engineers who are responsible for installing, starting up, or maintaining a RS3 installation. | **Prerequisites**<br>3100: modules 1, 2, 3 & 4 |
Shafer – Rotary Vane Maintenance & Field Service – Level 1 - VA109
CEUs – 1.6

Overview
This 2-day course presents a fundamental overview of the construction, assembly, hardware, and configuration of Shafer actuators. Students attending this program will demonstrate an ability to identify actuators, hardware, components, and assemblies. All students will demonstrate the ability to setup, check, and verify operation of various actuator configurations using appropriate methods shown in the class.

Topics
- Basic design and power transmission fundamentals
- Component tear down and rebuild
- Hydraulic schematics
- Installation and Commissioning
- Modification kits

Prerequisite
Students should have a minimum of one year field service experience and working knowledge of hydraulic actuators.
Syncade·Administration·7087
CEUs – 1.4
Overview
This 2-day Syncade Administration Course will provide an overview of Syncade administration functions, tools and practices to successfully maintain the MES platform. Students will engage in lectures reinforced by practical hands-on labs.

Topics
• Syncade System Requirements
• User Accounts
• Syncade Installation
• Network Load Balancing
• Service Controller (Consumer and Scheduler)
• Integration Types
• Internet Information Services
• Errors Logging
• Administration Tool
• Hotfix Installation
• SQL discussion
• Reporting
• Troubleshooting Tips
• System Management Recommendations

Audience
This course is designed for System Administration personnel responsible for administering and successfully managing Syncade MES platforms.

Prerequisites
7080 - Syncade Overview

Syncade·Administration·Virtual·7087V
CEUs – 1.4
Overview
This 2-day Virtual Syncade Administration Course will provide an overview of Syncade administration functions, tools and practices to successfully maintain the MES platform. Students will engage in lectures reinforced by practical hands-on labs.

Topics
• Syncade System Requirements
• User Accounts
• Syncade Installation
• Network Load Balancing
• Service Controller (Consumer and Scheduler)
• Integration Types
• Internet Information Services
• Errors Logging
• Administration Tool
• Hotfix Installation
• SQL discussion
• Reporting
• Troubleshooting Tips
• System Management Recommendations

Audience
This course is designed for System Administration personnel responsible for administering and successfully managing Syncade MES platforms.

Prerequisites
7080 - Syncade Overview

Syncade™·Document Control and Archiving·7081
CEUs – 1.4
Overview
This 2-day class provides the user with the necessary skills to set up, configure and maintain the DCA module in Syncade. Students will be taught repository setup and administration settings, how to add documents to a user configured repository structure using manual or automated techniques, manually move documents through the promotion model as well as editing existing documents and making them available to the production cycle. Users will configure and use the Change Request feature within DCA to move documents through the promotion model. Change request types and workflows will be created and users assigned to the roles in the steps to automate the document promotion process. Document packages will also be taught in this class. Users will create package classes that will be used to create a print package for a production run.

Topics
• DCA Overview
• DCA User Interface
• Repository Creation, Configuration and Use
• Document Types
• Configured Properties
• Creating Document Properties
• Adding Documents — Manual/Autoloader
• Document Life Cycle
• Document Change Control
• Change Request User Interface
• Change Request Life Cycle
• Change Request Types
• Change Request Workflows
• Creating Change Requests
• Review and Approval Processes
• Document Packages Overview
• Packages User Interface
• Package Classes
Syncade™ - Document Control and Archiving - Virtual - 7081V
CEUs - 1.4

Overview
This 2-day class provides the user with the necessary skills to set up, configure and maintain the DCA module in Syncade. Students will be taught repository setup and administration settings, how to add documents to a user configured repository structure using manual or automated techniques, manually move documents through the promotion model as well as editing existing documents and making them available to the production cycle. Users will configure and use the Change Request feature within DCA to move documents through the promotion model. Change request types and workflows will be created and users assigned to the roles in the steps to automate the document promotion process. Document packages will also be taught in this class. Users will create package classes that will be used to create a print package for a production run.

Topics
- DCA Overview
- DCA User Interface
- Repository Creation, Configuration and Use
- Document Types
- Configured Properties
- Creating Document Properties
- Adding Documents — Manual /Autoloader
- Document Life Cycle
- Document Change Control
- Change Request User Interface
- Change Request Life Cycle
- Change Request Types
- Change Request Workflows
- Creating Change Requests
- Review and Approval Processes
- Document Packages Overview
- Packages User Interface
- Package Classes

Syncade™ - Overview – 7080
CEUs - 1.4

Overview
This 2-day class provides an overview of the Syncade applications and their use within a Manufacturing Execution System (MES) environment. The Syncade applications handle tasks that fit between the process control system environment, such as DeltaV™, and corporate Enterprise Resource Planning (ERP) systems, such as SAP. Each module in Syncade will be covered briefly to provide the user with a basic understanding of the module, its functionality and how it fits into the overall MES functional layer. Integration methods and implementation techniques are not part of this class.

Topics
- Manufacturing Execution Systems (MES)
- Document Control and Authoring
- Security Basics
- Portal
- Training and Development
- Equipment Tracking
- Materials Management
- Inventory Management
- Recipe Authoring
- Order Management
- Weigh and Dispense

Syncade™ - Equipment Tracking - Virtual - 7083V
CEUs - 1.4

Overview
This 2-day class will provide the user with the necessary skills to create, configure and maintain equipment used in the production process. Users will configure equipment classes and equipment that will provide a solution for managing equipment use, maintenance and calibration information. Events will be set upon the equipment class that define actions that can be performed, or need to be performed, on equipment created from the equipment class. Rules and groups will be configured to assist in implementing controls on equipment and when certain events need to occur. Schedules will be created to set up periodic preventive maintenance and work orders will be created to cover the unscheduled activities that may be needed to fully utilize production equipment.

Topics
- ET Overview
- Create Equipment Classes
- Define Calibration Targets
- Add Custom Properties
- Create Events and Event State Matrix
- Create Rules and Groups
- Material and Labor with Events
- Event Scheduling
- Create Equipment
- Integrating Documents and Skills
- Performing Events
- Work Orders
Syncade™ - Materials, Inventory and Order Management – 7084
CEUs - 2.1

Overview
This 3-day class will provide the user with the necessary skills to create and manage all types of materials as they flow into, through and out of the production environment during order execution. Users will create material masters to define the material characteristics, create inventory, create and execute orders, allocate materials, create material samples, track lots and containers and perform weigh and dispense activities.

Topics
- Material/Inventory Management Overview
- OM Overview
- Material Masters
- Material Properties
- Quality Statuses
- Order Creation and Execution
- Material Allocations
- Weigh and Dispense
- Trusted Dispensing
- Sampling
- Purchasing and Receiving
- Lot and Container Actions
- Physical Inventory
- Genealogy
- Inventory Adjustments

Syncade™ - Materials, Inventory and Order Management - Virtual - 7084V
CEUs - 2.1

Overview
This 3-day class will provide the user with the necessary skills to create and manage all types of materials as they flow into, through and out of the production environment during order execution. Users will create material masters to define the material characteristics, create inventory, create and execute orders, allocate materials, create material samples, track lots and containers and perform weigh and dispense activities.

Topics
- Material/Inventory Management Overview
- OM Overview
- Material Masters
- Material Properties
- Quality Statuses
- Order Creation and Execution
- Material Allocations
- Weigh and Dispense
- Trusted Dispensing
- Sampling
- Purchasing and Receiving
- Lot and Container Actions
- Physical Inventory
- Genealogy
- Inventory Adjustments

Syncade™ - Overview - 7080B
CEUs - 1.8

Overview
This 2-day class provides an overview of the Syncade applications and their use within a Manufacturing Execution System (MES) environment. The Syncade applications handle tasks that fit between the process control system environment, such as DeltaV™, and corporate Enterprise Resource Planning (ERP) systems, such as SAP. Each module in Syncade will be covered briefly to provide the user with a basic understanding of the module, its functionality and how it fits into the overall MES functional layer. Integration methods and implementation techniques are not part of this class. This course is online, on-demand and includes:

- Recorded lectures, workshop demonstrations, and instructions available for 6 months after course enrollment, Access to a dedicated student Syncade Workstation in the cloud to perform hands-on workshops available from 6 months or 15 hours of workstation run time (whichever occurs first). Requires a high speed internet (DSL minimum and HTML 5 compliant browser (prefer Chrome) Student Workbook sent to students.

Topics
- Manufacturing Execution Systems (MES)
- Document Control and Authoring
- Security Basics
- Portal
- Training and Development
- Equipment Tracking
- Materials Management
- Inventory Management
- Recipe Authoring
- Order Management
**Syncade™ - Recipe Authoring - 7095B**  
**CEUs - 2.1**

**Overview**  
This 3-day class will provide the user with the necessary skills to configure version 4.3 recipes. Users will learn to configure and execute manual, automation, and integrated recipes using Syncade and DeltaV. Recipes will be taken from the configuration stage, through execution, and into the order completed state. This process will teach users how a complete batch record is made.

This course is online, on-demand and includes: Recorded lectures, workshop demonstrations, and instructions available for 6 months after course enrollment. Access to a dedicated student Syncade Workstation in the cloud to perform hands-on workshops available from 6 months or 15 hours of workstation run time (whichever occurs first). Requires a high speed internet (DSL minimum and HTML 5 compliant browser (prefer Chrome) Student Workbook sent to students

**Topics:**  
- Recipe Authoring (RA) Overview  
- RA Application  
- Manual and Automation Recipe Hierarchy  
- Work Instructions and Parameter Types  
- Operations, Unit Procedures and Procedure Creation  
- RA Simulator  
- Process Segments  
- Master Recipes  
- Order Execution  
- Parameter Referral and Deferral  
- Reference Groups  
- Formula Creation/Selection  
- Behaviors  
- DeltaV Recipes  
- Integrated Type 2 and 3 Recipes

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**Syncade™ - Recipe Authoring - Virtual - 7095V**  
**CEUs - 2.1**

**Overview**  
This 3-day class will provide the user with the necessary skills to configure version 4 recipes for Syncade execution. Users will learn to configure manual recipes, DeltaV recipes and recipes that integrate the Syncade and DeltaV into a complete cohesive batch record.

**Topics**  
- Recipe Authoring (RA) Overview  
- RA Application  
- Manual and Automation Recipe Hierarchy  
- Work Instructions and Parameter Types  
- Operations, Unit Procedures and Procedure Creation  
- RA Simulator  
- Process Segments  
- Master Recipes  
- Order Execution  
- Parameter Referral and Deferral  
- Reference Groups  
- Formula Creation/Selection  
- Behaviors  
- DeltaV Recipes  
- Integrated Type 2 and 3 Recipes

Note: Detailed application classes available to customers that have purchased Syncade.

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**Syncade™ - Training and Development – 7082**  
**CEUs - 0.7**

**Overview**  
This 1-day class will provide the user with the necessary skills to configure the Training and Development module to successfully ensure the workforce is up to date with job related skill sets. Users will configure the tasks and skill sets necessary for an individual to complete a job function as well as maintain those skills over time. Users will configure an organizational structure that will be used to define departments and positions and assign skills to those positions that will set the requirements for a person holding that position. Courses will be created that will teach the tasks required to fill a position in the organization.

Users will also schedule classes and learn how to enroll themselves and others using the training and requirement planners in the TD module. Users will also be taught how to set up the notification processes within the Syncade administration menus.

**Topics**  
- TD Overview  
- Defining the Organizational Structure  
- Creating Tasks

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**Syncade™ - Training and Development – 7082 – Continued...**

- Creating Skills and Assigning Tasks  
- Certification Methods  
- Setting Up Training Classes  
- Creating Job Requirements  
- Integrating TD with Other Syncade Modules  
- Maintaining Necessary Job Related Skills Administration Notification Processes

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**Syncade™ - Administration - 7087 (V)**  
**CEUs: 1.4**

**Overview**  
This 2-day Syncade Administration Course will provide an overview of Syncade administration functions, tools and practices to successfully maintain the MES platform. Students will engage in lectures reinforced by practical hands-on labs.

**Topics**  
- Syncade System Requirements  
- User Accounts  
- Syncade Installation  
- Network Load Balancing  
- Service Controller (Consumer and Scheduler)  
- Integration Types  
- Internet Information Services  
- Errors Logging  
- Administration Tool  
- Hotfix Installation  
- SQL discussion  
- Reporting  
- Troubleshooting Tips  
- System Management  
- Recommendations

**Audience**  
This course is designed for System Administration personnel responsible for administering and successfully managing Syncade MES platforms.

**Prerequisites**  
- 7080 - Syncade Overview
Educational Services Information

IACET Authorized Provider

Educational Services is an Authorized Provider of International Association for Continuing Education and Training (IACET) Continuing Education Units (CEU). IACET Authorized Provider Status Means our Organization:
- Demonstrates compliance with proven, research-based standards created in cooperation with the U.S. Department of Education
- Is dedicated to high standards for quality in continuing education and training
- Awards the IACET CEU, the hallmark for quality in continuing education and training

Educational Services is proud to have received Authorized Provider status and appreciate the opportunity to share our training with you.

Qualifications for Enrollment

Educational Services agrees to accept for training, individuals who are not competitors of Emerson Process Management in the field to which the training pertains. Educational Services will provide reasonable accommodations to students who have a physical or mental impairment that substantially limits one or more major life activities, as long as the accommodation does not put undue hardship on the Company.

Course Scheduling, Locations & Pricing

Course schedule and locations including length, dates of each session and price are listed on the Educational Services price sheet that came with your catalog. All prices are in U.S. dollars. For the most up to date information call or visit our website at: www.emerson.com/education

Tuition

Methods of payment include: purchase order, acceptable credit cards include: Visa, MasterCard and American Express. All tuition is subject to change without notice. Transportation, personal expenses and most meals are the responsibility of the student.

Cancellations & Transfers

If your plans or budgets change, you may cancel/transfer your reservations up to 14 calendar days prior to the start of the course without incurring a cancellation charge. Limited enrollment makes it necessary to charge 50% of the full tuition for cancellations/transfers received during the 14 days prior to the start of the course, and full tuition for failure to attend without cancelling. Substitutions are accepted until the first day of class.

Arrival & Departure Time

Students should plan to arrive the day prior to the course starting day, as class typically begins at 8 a.m. If traveling by air, please allow sufficient time to travel to the airport and check-in when scheduling return transportation.

Course Materials

All materials presented are copyrighted. Audio and video recording is prohibited and no material or portion of any school may be reproduced in any manner without prior written approval. All necessary documentation, catalogs, and literature are included in the course tuition.

Continuing Education Units

Continuing Education Units (CEUs) are awarded for the successful completion of most Emerson Process Management schools, based on 80% minimum attendance and satisfactory class and lab participation as determined by the course instructor.

On-Site and Local Training

Educational Services instructors are available to provide expert training anywhere in the world. We can conduct training tailored to meet your needs at your facility or regional and local sites. To learn more about on-site and local training contact your local Emerson Process Management service provider or call 1-800-338-8158 or 641-754-3771.

eLearning

Find all eLearning courses in MyCONNECT- Educational Services NEW Self Enrollment Tool
www.emerson.com/education > MyCONNECT
# Asia Pacific Training Center Contact Information


For pricing and schedules, please contact the respective site in your area of interest.

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<td>Emerson Process Management Asia Pacific PTE LTD</td>
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<tr>
<td>Educational Services, Singapore</td>
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<td>Emerson Process Management</td>
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<td>South Korea 462-806</td>
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<td>Country</td>
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<tr>
<td><strong>Europe, Education Contacts</strong></td>
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<th>Latin/South America, Education Contacts</th>
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<td>Provincia de Buenos Aires</td>
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<td>Argentina</td>
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<td>Contact: Cintia Hassan</td>
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<td>Phone: 54-11-4797-7448</td>
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<td><a href="http://www.emersonprocess.com.ar">www.emersonprocess.com.ar</a></td>
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<tr>
<td><strong>Mexico, Mexico City</strong></td>
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<td>Emerson Process Management, S.A. de C.V.</td>
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<td>Calle 10 #145</td>
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<td>Col. San Pedro de los Pinos</td>
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<td>Del. Alvaro Obregón, México, D.F. 01180</td>
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<td>Fax: +52 55 5397 4880</td>
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<td><strong>Puerto Rico</strong></td>
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<td>Emerson Process Management Puerto Rico</td>
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<td>STE 501 Guaynabo</td>
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<th>Middle East/Africa, Education Contacts</th>
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<tbody>
<tr>
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<tr>
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<td>7th Floor Mazen Al Saeed Business</td>
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<td>Tower Dammam Khobar Highway</td>
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<td>Cnr. Leader and Hoefyster St.</td>
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<td>Stormill, Roodepoort, 1724, Republic of South Africa</td>
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<td>PO Box 105958</td>
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<tr>
<th>North America, Canada Education Contacts</th>
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<tbody>
<tr>
<td><strong>Edmonton, Calgary, Saskatoon, Fort McMurray, Burnaby</strong></td>
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<td>780-468-5463</td>
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<td><a href="mailto:Education-Services@SpartanControls.com">Education-Services@SpartanControls.com</a></td>
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<td>8403 - 51 Avenue</td>
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<td>Spartan Controls Ltd.</td>
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<td>Fax: 780-440-8361</td>
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<td><strong>EnTech Control</strong></td>
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<td>Email: <a href="mailto:Norman.Ito@emerson.com">Norman.Ito@emerson.com</a></td>
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## Course Offerings Contact Information

### Brand/Company, Education Contacts

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<tr>
<th>AMSTM Suite / DeltaVTM/ FOUNDATION™ fieldbus / Process</th>
<th>Control /PROVOX/ RS3/ SyncadeSmart Operation Management / Wireless:</th>
<th>Machineries Health™:</th>
</tr>
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<tr>
<td>800-338-8158 or 641-754-3771 e-mail: <a href="mailto:Education@Emerson.com">Education@Emerson.com</a></td>
<td>800-338-8158 or 641-754-3771 e-mail: <a href="mailto:Education@Emerson.com">Education@Emerson.com</a></td>
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<td>Emerson Process Management, Educational Services: PO Box 190/205 South Center Street</td>
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<td>Emerson Process Management 835 Innovation Dr.</td>
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<td>[36x737]1</td>
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<tr>
<td>[41x157]Missouri City, TX courses: 281</td>
<td>[41x167]Mansfield, OH courses: 4590</td>
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<td>[41x187]Houston, TX 77065 19200 Northwest Freeway 281</td>
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</table>
Educational Services Learning Paths

Education@emerson.com
Or more training options see us at:
www.emerson.com/education
Overview
During the 4-1/2-day course, the student will be able to define system capabilities, define nodes, configure continuous and sequential control strategies, create process alarms, operate the system, troubleshoot the system and modify operator displays. This course includes access to a virtual DeltaV system to practice and review course workshops complete with brief recorded demonstrations available after course completion.

Topics
- System Overview
- DeltaV Explorer
- DeltaV Diagnostics
- Control Modules
- Control Studio
- Motor Control with Interlocking and Permissive Conditions
- Cascade Control
- Regulatory Control
- DeltaV Operate
- System Operation
- Alarms & Process History View
- Alarm Help
- Sequential Function Charts
- Configure Theme Dynamos
- Electronic Marshalling (CHARMS)

Audience
This course is designed for process & process control engineers responsible for obtaining key production data, maintaining, configuring and troubleshooting a DeltaV system.

Prerequisites
Microsoft Windows experience. Prospective attendees lacking process control experience should first attend Control Loop Foundation, Course 9025. Prospective attendees new to DeltaV should first attend PlantWeb/DeltaV Introduction, or DeltaV Hardware & Troubleshooting, Course 7018.

Overview
This 4-1/2-day course covers the implementation of a complete batch application. A process simulator will provide a batch application. Students will use DeltaV Batch software to configure recipe entities including, Aliasing, Equipment Trains, Dynamic Unit Allocation, Phase Logic, Operations and Unit Procedures. Equipment entities will also be configured including, Units modules and Process cells. This course includes access to a virtual DeltaV system to practice and review course workshops complete with brief recorded demonstrations available after course completion.

Topics
- Batch Overview
- Unit Phase
- Alias Definition
- Unit Module
- Process Cell
- Class Based Control Modules
- Class Based Equipment Modules
- Operation
- Unit Procedure
- Procedure
- Equipment Trains
- Unit Aliasing
- Dynamic Unit Allocation

Audience
This course is designed for individuals responsible for configuring and commissioning DeltaV Batch software.

Prerequisites
Course 7009, DeltaV Implementation I
CEUs – 3.2

Overview
This 4-1/2-day course is for process control engineers responsible for configuring advanced functionality in the DeltaV user interface. This course expands on graphic topics covered in both the DeltaV Implementation course 7009 and DeltaV Implementation II course 7017.

Topics
- Visual Basic Primer
- Forms
- Modules
- Schedules
- User Preferences
- Picture Sizing
- Environment Customization
- Custom Faceplates
- Function Block Faceplates
- FRS Functions
- Pop Up Menus
- Color Threshold Tables
- Custom Dymamos
- Tag Groups
- Key Macro Editor
- Theme Dymamos

Audience
This course is for process control engineers responsible for configuring advanced functionality in the DeltaV user interface.

Prerequisites
Course 7009, DeltaV Implementation I

DeltaV - PMO Configuration Standard (PCSD) – 7076 / V
CEUs – 3.2

Overview
This 4½ day course will introduce students to the PCSD structure and commonly used PCSD templates for analog, discrete and regulatory control. Students will also learn how to implement new DeltaV control modules using the PCSD library.

Upon completion of this course, the student will be able to:
- Modify existing control strategies while maintaining consistency with the PCSD library
- Add control strategies while maintaining consistency with the PCSD library

Topics:
Benefits of a structured approach to configuration
- PCSD Structure
- Operator graphics standards
- Configuration of the following using PCSD class-based modules:
  - Analog value reading and setting
  - Control of discrete devices
  - Loop control
- Sequential control using Equipment Modules
- Modification of existing PCSD-based control configuration
- PCSD methods for:
  - Module arbitration
  - Mode locking
  - Mode, state and failure propagation
  - Inter-module interfacing
  - Interlocks, permissive and force set points

Audience:
This course is designed for engineers and technicians who maintain a DeltaV system configured using the PMO Configuration Standards for DeltaV (PCSD) library.

Prerequisites:
Course 7009, DeltaV Implementation I and familiarity with process control

DeltaV - Advanced Control – 7201V
CEUs – 3.2

Overview
This 4-½ day course introduces students to the advanced control tools available within the DeltaV system and how they may be used to improve plant operations. The principal technology that is utilized in each product will be discussed. The areas of improvement that may be achieved will be detailed. Also, each student will gain hands on experience with these tools in class exercises based on realistic process simulations.

Topics
- The Control Foundation in DeltaV
- Traditional Tools e.g. Override, Cascade, Ratio
- Improvements Provided by Advanced Control
- DeltaV Inspect with InSight
- Detection of Abnormal Conditions
- Performance Indices
- Performance Reports
- DeltaV Tune with InSight
- Measurement of Process Dynamics
- Tuning Methods
- Tuning Response
- Process Learning
- Adaptive Tuning
- Adaptive Control
- DeltaV Fuzzy
- Principles of Fuzzy Logic Control
- FLC Function Block, Tuning
- DeltaV Predict
- MPC for Multi-Variable Control
- Model Identification, Data Screening
- Simulation of Response, Tuning
- DeltaV Neural
- Creation of Virtual Sensor
- Data Screening, Training
- DeltaV Simulate Suite
- Process Simulation
- Simulate Pro

Prerequisites
7009, DeltaV Implementation I or equivalent field experience.

DeltaV - Analyze Features Training - e7045
CEUs -.20

Overview
This course is for personnel who will be using DeltaV Analyze in their alarm management program. This on-line course includes audio presentations, quizzes, and up to a four hour access to DeltaV Analyze. To obtain hands on experience, e7045 students will have four hour access to DeltaV Analyze over a two week timeframe.

Topics
- DeltaV Analyze Overview
- DeltaV Analyze Administration Features
- How to Create a Bookmark
- How to Create an Alarm Statistics Report

Course access is 12 months
DeltaV™ - Administration / Technicians

DeltaV - Model Predictive Control – 7202V
CEUs – 2.4

Overview
This 3-1/2-day course is designed for process and control engineers who are applying DeltaV Predict and Predict Pro. It provides practical examples of how to determine the benefits of MPC application and how this control may be used to meet specific application requirements. Students will gain hands on experience through lab exercises based on realistic dynamic process simulations.

Topics
• How to Justify an MPC Project
• Meeting Application Requirements
• Tailoring Control Performance
• Audience

Prerequisites
7201 DeltaV Advanced Control

DeltaV - Batch Analytics Model Builder - e7046
CEUs - .80

Overview
This 8-hour (average duration) on-line course provides an orientation of Batch Analytics Model Builder. The course includes audio presentations, demonstrations, hands-on practices, hands-on workshops, and quizzes. Course access is 12 months. Upon completion of this course, the student will be able to:

• Define basic principles of Batch Data Analytics and their use in fault detection and quality parameter prediction
• Use the Batch Data Analytics Model Builder application to build and deploy a project for fault detection and quality parameter prediction
• Users will be able to recognize and navigate the screens needed to build a model in Batch Analytics
• Users need to define batch logic, stage logic, and initial condition logic needed for model development
• Users will be able to interpret analytic data of the Model Builder application using a saline example

• Users will be able to build a Batch Data Analytics model

Topics
• Batch Analytics Overview
• Batch Analytics Model Builder Overview
• Batch Analytics Viewer Overview
• Batch Saline Simulation
• Benefits of Using Batch Analytics
• Batch Analytics Manager Administration
• Batch Logic, Stage Logic, and Initial Logic Required to Build a Model
• Batch Analytics Model Builder – Equipment
• Batch Analytics Model Builder – Product
• Batch Analytics Model Builder – Model

Audience
This course is designed for Chemometricians, Process Engineers, Quality Engineers, and Process Control Engineers.

Emerson Automation
Educational Services
www.emerson.com/education
www.emerson.com/myconnect
1-800-338-8158
1-641-754-3371
education@emerson.com
DeltaV – Model Predictive Control – 7203CV
CEUs – 3.2

Overview
This 4-1/2-day course is designed for process and control engineers who are applying DeltaV Predict and Predict Pro. This is a condensed course with selected content from Courses 7201 and 7202. It provides practical examples of how to determine the benefits of MPC application and how this control may be used to meet specific application requirements. Students will gain hands on experience through lab exercises based on realistic dynamic process simulations.

Topics
How to Implement an MPC Solution
- DeltaV MPC Function Blocks and Predict / Predict Pro
- MPC for Multi-Variable Control
- Model Identification, Data Screening
- Simulation of Response, Tuning
How to Justify an MPC Project
- Evaluating the Cost of Process Variation
- Estimating the Reduction in Variation that is possible using MPC
- Calculating the Benefit of Maximizing throughput when plant production is restricted by Input Limits or Measurable Constraint
Meeting Application Requirements
- Ensuring Disturbance Inputs are Independent of Other Process Inputs
- Meeting Control Requirements when the Response Times are Very Different
- Understanding the Design and Testing of an Integrating Process
Tailoring Control Performance
- Placing more Emphasis on Selected Control or Constraint Parameters
- Improving Control Performance when the Process is Dead time Dominant
- Compensating for Large Changes in Process Gain or Dynamics
- Minimizing the Impact of Process Noise on Control Performance MPC Application
- Selecting and Applying MPC, MPC-Pro and MPC-Plus Blocks Optimizing Control
- Optimizing the Control Using the MPC-Pro or MPC-Plus Blocks

Audience
This course is designed for process and control engineers who are applying DeltaV Model Predictive Control.

Prerequisites
7201 DeltaV Advanced Control

DeltaV - SIS Implementation – 7305V
CEUs – 3.2

Overview
This 4-1/2-day course is a hands-on instructor led course. The course covers complete DeltaV SIS Implementation including hardware and software architecture. Students will be able to design a DeltaV SIS Network and Safety Instrumented Functions (SIFs). Additionally, students will be able to configure smart SIS instruments and their associated alerts, including partial stroke testing.

Topics
- DeltaV SIS Overview
- DeltaV SIS SLS 1508 Hardware Architecture
- DeltaV SIS with Electronic Marshalling Hardware Architecture
- DeltaV Safety Instrumented Functions
- Rosemount SIS Instruments
- AMS Device Manager relating to DeltaV SIS
- Fisher™ SIS Digital Valve Controllers
- SISNet Repeaters
- DeltaV SIS Security
- DeltaV Version Control
- Local Safety Network Bridges

Audience
This course is for personnel who design, implement, commission and service DeltaV SIS.

Prerequisites
Course 7009 is a requirement. Recommend IEC 61511 knowledge.

DeltaV – Administration - 7027
CEUs – 3.2

Overview
This 4-1/2-day course is designed for control system administrators, process control engineers and IT specialist responsible for managing, installing, and commissioning a DeltaV system. This course includes access to a virtual DeltaV system to practice and review course workshops complete with brief recorded demonstrations available after course completion.

Topics
- Overview of system components and topologies
- DeltaV domain setup, including independent deltav domain controllers
- DeltaV installation procedures
- Licensing
- Import and export of configuration
- Firmware upgrades
- Controller health diagnostics
- User administration
- Configuration Database administration
- Creating additional workstations
- Auto Update services
- Continuous historian administration
- Advanced continuous historian administration
- Remote desktop services
- Event chronicle administration
- Network Time Protocol configuration/diagnostics
- Backup and restore procedures

Audience
This course is designed for control system administrators, process control engineers and IT specialist responsible for managing, installing, and commissioning a DeltaV system.
DeltaV - Virtualization – 7029
CEUs 3.2

Overview
This 4-1/2-day course focuses on the installation, configuration and system administration of a virtualized DeltaV distributed control system. Using a combination of lectures and workshops students will learn skill sets that enable them to properly plan, implement and maintain a robust DeltaV Virtual Studio (DVS) system intended for online (production) use. A key objective of this course is to prepare students for all aspects of owning a DVS system with special emphasis on providing highly available, reliable and secure access for end users of the DVS system.

Topics
• Virtualization Primer — Basics of How Virtualization Works
• Overview of DeltaV Virtualization Solutions
• Planning a DeltaV Virtual Studio System
• Installing and Configuring a VRTX Chassis and Blade Servers
• Creating DeltaV Virtual Machines including a ProfessionalPlus Node
• Configuring a WYSE or a Pepperl+Fuchs Thin Client and Redundant Thin Client Networks
• Create a Highly Available Failover Cluster
• Patching and Hardening of Cluster Nodes
• Cluster Health Monitoring and Troubleshooting
• Disaster Recovery and Replication
• Upgrading and Capacity Expansion

Audience
This course is designed for system administrators responsible for installing and maintaining DeltaV Workstations on a virtual platform.

Prerequisites
Course 7027, DeltaV Systems Administration for Windows 7 and Server 2008

AMS - Device Manager with DeltaV – 7039
CEUs – 2.8

Overview
This 4-day course is for instrumentation technicians responsible for all areas of managing and ensuring the reliability of instrumentation in the plant process including startup and commissioning, normal operations, maintenance, and troubleshooting.

Topics
• DeltaV and PlantWeb Overview
• AMS Device Manager Overview
• FOUNDATION™ fieldbus Overview
• ValveLink™ SNAP-ON Introduction
• ValveLink™ DVC Setup
• ValveLink™ SNAP-ON Tests and Diagnostics
• HART® Overview
• PROCONEX QuickCheck SNAP-ON
• PROFIBUS Overview
• PlantWeb Alerts
• AMS Device Manager User Interface
• Setup and use of Alert Monitor in AMS Device Manager
• Device Replacement for HART, Fieldbus, and PROFIBUS Devices
• AMS Device Manager Audit Trail
• AMS Device Manager Calibration Assistant
• Smart Commissioning

Audience
The target audience usually does following:
• Responds to work orders created to calibrate, troubleshoot, repair, service, and replace instruments and valves
• Monitors alerts to preemptively address problems prior to operators seeing a problem in the control room
• Provides loop testing & assistance with instrumentation in plant turnarounds, startups, and for project work
• Improves process availability & reduces operations and maintenance costs

Prerequisites
Microsoft windows experience. Minimal DeltaV and AMS experience is recommended but not required. Recommended to take 7018, but not required.
DeltaV - Power and Grounding for Electronic Systems – 5590
CEUs – 1.4

Overview
This course focuses on specific power and grounding requirements of a control system. You will learn:
- how to conduct site verifications
- how to audit using “hands-on” testing labs
- to detect power and grounding problems on existing sites

Topics
- Review of Power Basics
- Power System Measurements
- Low Voltage Power Systems
- Power System Grounding
- Earthing vs. Grounding
- Connection to Earth
- Equipment Grounding
- Code Requirements
- Building Power Distribution
- Feeders and Branch Circuits
- Separately Derived Systems
- Power & Grounding for the DeltaV System
- Single Point Grounding
- Isolated Ground Installations
- Dedicated Circuits
- DC Grounding
- Verifying New Installations
- Power Quality Problems
- Applying Power Conditioning
- SIS Power and Grounding Installation
- Intrinsic Safety Devices

Audience
This 2-day course is designed for personnel involved with the planning, installation and maintenance of DeltaV digital automation system and provides essential knowledge regarding the power and grounding system for DeltaV equipment.

Prerequisites
A working knowledge of electronics and AC power basics is required.

DeltaV - Hardware & Troubleshooting – 7018
CEUs – 2.8

Overview
This course provides an overview of the DeltaV Control Network, M- and S-series hardware, and software applications. Upon completion, you will be familiar with the hard-ware and be able to perform troubleshooting techniques. This 4-day course focuses on the hardware components that make up the DeltaV system: M-series controllers and I/O, S-series controllers and I/O (including CHARMs), and DeltaV Smart Switches. Using a combination of lectures and workshops, you will learn how to use operator and diagnostic tools to identify and locate hard-ware-related fault conditions. Workshops provide the opportunity to disassemble and reassemble the M- and S-series hardware and return the system to an operating state. If your systems include bus technologies such as Foundation Fieldbus, we recommend courses 7030, 7032, or 7037. The 7018 course satisfies the prerequisite requirement for these bus course (except 7032)

Topics
- DeltaV Overview
- Operator Alarms
- DeltaV Diagnostics
- DeltaV Smart Switches
- DeltaV I/O Cards and Carriers
- Controllers and Power Supplies
- Electronic Marshalling (CHARMs)
- HART® I/O
- DeltaV and AMS Suite Intelligent Device Manager
- Redundant I/O

Audience
This course is recommended for instrumentation and maintenance technicians, managers, and configuration engineers who need to know about DeltaV hardware.

Prerequisites
Windows Experience

DeltaV - Fieldbus Devices – 7030
CEUs – 2.8

Overview
This 4-day lecture/lab course provides maximum hands-on experience working with FOUNDATION™ fieldbus instruments such as: the FIELDVUE™ Digital Valve Controller, Rosemount Pressure and Temperature Transmitters. The student will use the DeltaV control system to commission fieldbus devices, assign foundation fieldbus function blocks to field devices, troubleshoot using diagnostics and AMS Device Manager to manipulate device parameters.

Topics
- DeltaV Saleable System Overview
- Macro Cycle Execution
- Fieldbus Function Blocks
- FIELDVUE™ Theory of Operation
- Transmitter Theory of Operation
- AMS Device Manager Methods
- Fieldbus Wiring Practices
- System Troubleshooting
- Accessing Fieldbus Devices
- Alarms and Alerts at DeltaV Workstations
- Segment Checkout Procedures
- Replace Wizard

Audience
This course is for individuals responsible for maintaining, troubleshooting, calibrating, and modifying FOUNDATION™ fieldbus device parameters.

Prerequisites
Course 7009, DeltaV Implementation I. or 7018, DeltaV Hardware Installation and Troubleshooting
DeltaV - Fieldbus Systems & Devices – 7032
CEUs – 2.8

Overview
This 4-day lecture/lab course provides maximum hands-on experience working with FOUNDATION™ fieldbus instruments such as: the FIELDVUE™ Digital Valve Controller, Rosemount Pressure and Temperature Transmitters. The student will use the DeltaV control system to commission fieldbus devices, assign foundation fieldbus function blocks to field devices, troubleshoot using diagnostics and AMS Device Manager to manipulate device parameters.

Topics
• FOUNDATION™ fieldbus Overview
• Macro Cycle Execution
• Fieldbus Function Blocks
• Control Anywhere
• Fieldbus Wiring and Installation
• Segment Checkout Procedures
• Commissioning and Configuring Devices
• Control Strategy Configuration
• Configuring an Operator Display

Audience
This course is for individuals responsible for designing and configuring FOUNDATION™ fieldbus segments; as well as analyzing the fieldbus macro cycle, troubleshooting fieldbus segments/devices and modifying FOUNDATION™ fieldbus parameters.

Prerequisites
7009 DeltaV Implementation I or 7018 DeltaV Hardware Installation and Troubleshooting.

DeltaV- Communication Bus Interfaces w/the DeltaV System – 7037
CEUs – 2.5

Overview
This 3-1/2-day course covers the integration of fieldbus compliant devices using DeltaV systems. Upon completion of the course the student will be able to install, configure and verify proper operations of AS-I, Profibus DP, DeviceNet Serial, EtherNet IP, and Wireless HART® devices, including proper wiring practices. The AMS Intelligent Device Manager will be used to interrogate PROFIBUS DP and Wireless HART devices. The target audience usually does the following:
Responds to work orders created to calibrate, troubleshoot, repair, service, and replace instruments and valves
• Monitors alerts to preemptively address problems prior to operators seeing a problem in the control room
• Provides loop testing and assistance with instrumentation on plant turnarounds, startups, and for project work
• Improves process availability and reduces operations and maintenance costs

Topics
• Communication Bus Introduction
• AS-I Overview
• AS-I: Wiring and Installation
• AS-I Network with DeltaV
• PROFIBUS DP Overview
• PROFIBUS Wiring and Installation
• Configuring a PROFIBUS Segment
• Device Net Overview
• Device Net Diagnostics and Configuration
• Troubleshooting
• Serial Interface
• HART® Overview
• Ethernet I/O Overview
• Wireless I/O Overview

Audience
This course is for individuals responsible for designing and configuring FOUNDATION™ fieldbus segments; as well as analyzing the fieldbus macro cycle, troubleshooting fieldbus segments/devices and modifying FOUNDATION™ fieldbus parameters.

Prerequisites
7009 DeltaV Implementation I or 7018 DeltaV Hardware Installation and Troubleshooting.

DeltaV Safety Instrumented System with SLS 1508 Maintenance – 7033
CEUs – 2.1

Overview
This 3-day course is a hands-on instructor-led course. This course covers the architecture of the DeltaV SIS including Rosemount SIS Instruments and Fisher™ SIS Digital Valve Controllers. Students will gain a working knowledge of the hardware and software allowing them to troubleshoot and maintain the system.

Topics
• Safety Lifecycle
• DeltaV SIS Overview
• DeltaV SLS1508 Hardware
• Safety Instrumented Functions
• Rosemount SIS Instruments
• AMS Device Manager
• Fisher™ SIS Digital Valve Controller
• SISNet Repeaters

Audience
This course is for Electrical & Instrument technicians, maintenance technicians, E/I/reliability engineers and other personnel responsible for maintaining a DeltaV SIS SLS 1508.

Prerequisites
Course 7018, DeltaV Hardware and Troubleshooting, is a requirement.
DeltaV - SIS with Electronic Marshalling

**Overview**
This 3-day hands-on instructor led course covers the architecture of the DeltaV SIS with Electronic Marshalling including Rosemount SIS instruments and Fisher™ SIS Digital Valve Controllers. Students will be able to identify the DeltaV SIS with Electronic Marshalling hardware and software components. Students will practice troubleshooting and maintenance techniques with DeltaV SIS simulators throughout the course.

**Topics**
- Safety Lifecycle
- DeltaV SIS Overview
- DeltaV SIS with Electronic Marshalling Hardware architecture including power requirements
- Commissioning and Downloading the DeltaV SIS with Electronic Marshalling components
- Safety Instrumented Functions
- Rosemount SIS Instruments
- AMS Device Manager
- Fisher™ SIS Digital Valve Controller
- DeltaV Diagnostics
- DeltaV SIS with AMS Intelligent Device
- Local Safety Network Bridges

**Audience**
This course is for Electrical & Instrument technicians, maintenance technicians, E&I/reliability engineers and other personnel responsible for maintaining DeltaV SIS with Electronic Marshalling.

**Prerequisites**
Course 7018 DeltaV Hardware and Troubleshooting is a requirement.

DeltaV - Operator Interface for Batch

**Overview**
This 2-1/2-day course uses lectures and hands-on workshops to provide an in-depth overview on operating the DeltaV System. It includes all content in course 7012 plus students will:
- understand basic batch terminology
- manipulate Unit Module parameters
- access the Batch Operator Interface
- run procedures
- review batch history data

**Topics**
- System Overview
- Accessing DeltaV Operate
- Window, Menus Displays and Directories
- Discrete, Analog, Regulatory and Cascade Control Module Operation
- Motor Control Module Operation
- Accessing Alarm Displays/Alarm Handling
- Accessing Real-time/Historical Trend Data
- Process History View
- Sequential Function Chart Operation
- Phase and Recipe Controls
- Batch Operator Interface
- Batch Historian
- Campaign Manager

**Audience**
This course is for operators, supervisors, and managers responsible for the operation of batch processes using DeltaV system.
DeltaV - Operator (v11/v12) Interface for Batch - e7014
CEUs – 1.6

Overview
This is an interactive 16-hour on-line course with DeltaV screens including audio presentations, demonstrations, practice sessions, workshops, quizzes and a final examination. Note: Course access is 12 months.

Topics
- System Overview
- Accessing DeltaV Operate
- Navigation in DeltaV Operate
- Discrete, Analog, Regulatory, and Cascade Control Module Operation
- Motor Control Module Operation
- Accessing Alarm Displays
- Accessing Real-Time/Historical Trend Data
- Accessing Process History View
- Phase and Recipe Controls
- Batch Operator Interface
- How to Add/Run Batches

Audience
Operators, supervisors, and managers responsible for the operation of a batch process using the DeltaV system.

DeltaV - Batch Analytics Operator - e7044
CEUs - .6

Overview
This 6-hour (average duration) on-line course provides an orientation of Batch Analytics and how it is used in a production environment. The course includes audio presentations, demonstrations, hands-on practices, hands-on workshops, and quizzes. Upon completion of this course, the student will be able to:

- Define basic principles of Batch Analytics
- Identify how Batch Analytics is used in fault detection and quality parameter prediction
- Identify the Batch List, Quality Prediction, and Fault Detection screens
- Monitor a fault
- Interpret analytic data of a saline example
- Identify the root cause of a detected fault

Topics
- Batch Analytics Overview
- Batch Analytics Model Builder Overview
- Batch Analytics Viewer Overview
- Batch Saline Simulation
- Benefits of Using Batch Analytics
- Batch Analytics Viewer – Batch List Tab
- Batch Analytics Viewer – Fault Detection Tab
- Batch Analytics Viewer – Quality Prediction

Audience
This course is designed for operators, process engineers, and management.

Prerequisites
DeltaV Batch experience and Microsoft Windows experience is required.

Delta™ Essential Operator Training Solution

Overview
Delta™ Essential Operator Training Solution is an engineered, hands-on, customized learning environment to up-skill your operations workforce. Operators will learn DeltaV operating concepts using curriculum based on their specific displays as well as hands-on practice workshops relevant to their process.

The Delta™ Essential Operator Training Solution includes instructional materials, customized student curriculum, and workshops all customized to your specific graphics and module types. Student workshops include low fidelity tieback simulation to demonstrate module functionality and perform workshops.

Delta™ Essential Operator Training Solution is available in three delivery formats.
1) Traditional classroom with live instructors and equipment
2) Virtual classroom environment with live online instruction and DeltaV distributed control systems (DCS)
3) A new blended learning environment that uses state-of-the-art technologies to host training in the cloud.

For more information, contact your local Emerson sales office or visit: www.emerson.com/education
**DeltaV - Fieldbus Measurement Instruments – 2370 CEUs - 2.1**

**Overview**
This 3-day class covers the integration of FOUNDATION™ fieldbus compliant measurement devices using the Field Communicator, Emerson USB Fieldbus Modem, AMS Device Manager, and other hosts.

Upon completion of this course students will be able to: install, configure, calibrate, and troubleshoot Rosemount Fieldbus devices which include the 3051C and 3051S Pressure Transmitters, 644, 3144P and 848 Temperature Transmitters 5600, 5400 and 5300 Radar Level Transmitters, and 752 Indicator.

**Topics**
- FOUNDATION™ fieldbus Overview
- Fieldbus: Wiring/Segment Design/Function Blocks
- Field Communicator Operation
- AMS Device Manager Operation
- Theory of Operation, Installation, Configuration, Maintenance, Calibration and Troubleshooting on the following:
  - 3051C Pressure Transmitter
  - 3051S Pressure Transmitter
  - 3144P, and 644 Temperature Transmitters
  - 848 Temperature Transmitter
  - 5600, 5400 and 5300 Radar Level Transmitters
  - 752 Fieldbus Indicator

Note: Course may be conducted using other Fieldbus Hosts, such as AMS Device Manager.

**Audience**
This course is for individuals responsible for installing, configuring, calibrating, and troubleshooting FOUNDATION™ fieldbus measurement devices.

**Prerequisites**
Experience in instrument calibration, maintenance, installation, and operation would be helpful.

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**DeltaV - Fieldbus Devices – 7030 CEUs – 2.8**

**Overview**
This 4-day lecture/lab course provides maximum hands-on experience working with FOUNDATION™ fieldbus instruments such as: the FIELDVUE™ Digital Valve Controller, Rosemount Pressure and Temperature Transmitters. The student will use the DeltaV control system to commission fieldbus devices, assign foundation fieldbus function blocks to field devices, troubleshoot using diagnostics and AMS Device Manager to manipulate device parameters.

**Topics**
- DeltaV Scalable System Overview
- Macro Cycle Execution
- Fieldbus Function Blocks
- FIELDVUE™ Theory of Operation
- Transmitter Theory of Operation
- AMS Device Manager Methods
- Fieldbus Wiring Practices
- System Troubleshooting
- Accessing Fieldbus Devices
- Alarms and Alerts at DeltaV Workstations
- Segment Checkout Procedures
- Replace Wizard

**Audience**
This course is for individuals responsible for installing, configuring, calibrating, and troubleshooting FOUNDATION™ fieldbus devices parameters.

**Prerequisites**
7009 DeltaV Implementation I or 7018 DeltaV Hardware Installation and Troubleshooting.

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**DeltaV - Fieldbus Systems & Devices – 7032 CEUs – 2.8**

**Overview**
This 4-day lecture/lab course provides maximum hands-on experience working with FOUNDATION™ fieldbus instruments such as: the FIELDVUE™ Digital Valve Controller, Rosemount Pressure and Temperature Transmitters. The student will use the DeltaV control system to commission fieldbus devices, assign foundation fieldbus function blocks to field devices, troubleshoot using diagnostics and AMS Device Manager to manipulate device parameters.

**Topics**
- FOUNDATION™ fieldbus Overview
- Macro Cycle Execution
- Fieldbus Function Blocks
- Control Anywhere
- Fieldbus Wiring and Installation
- Segment Checkout Procedures
- Commissioning and Configuring Devices
- Control Strategy Configuration
- Configuring an Operator Display

**Audience**
This course is for individuals responsible for designing and configuring FOUNDATION™ fieldbus segments; as well as analyzing the fieldbus macro cycle, troubleshooting fieldbus segments/devices and modifying FOUNDATION™ fieldbus parameters.

**Prerequisites**
7009 DeltaV Implementation I or 7018 DeltaV Hardware Installation and Troubleshooting.
Overview
This 3-day course reviews the role and function of control valve positioners followed by a series of hands-on exercises to disassemble, inspect, assemble, install, and commission a FOUNDATION™ fieldbus FIELDVUE™ digital valve controller. During commissioning, students will learn the basics of the FOUNDATION fieldbus protocol, the role of function blocks, addressing, modes and status. Students will configure, calibrate, and commission devices using the 475 Field Communicator and ValveLink™ software. Hands-on exercises also teach students how to perform detailed setup routines and how to run and collect data for various ValveLink software diagnostics.

Topics
- Positioner Basics
- FOUNDATION™ fieldbus overview
- FIELDVUE™ digital valve controller installation and mounting
- Modes and status
- Configuration and calibration with the 475 Field Communicator
- ValveLink™ software guided Setup /Detailed Setup
- Tuning
- Tag management
- Pressure control
- ValveLink software diagnostics
- FIELDVUE instrument troubleshooting

Audience
This course teaches technicians and engineers the basics of FOUNDATION™ fieldbus digital valve controller installation, configuration, calibration, and troubleshooting using the 475 Field Communicator, and ValveLink™ software.

Prerequisites
Completion of 1450 recommended but not required.
## LEARNING PATHS

### DeltaV Distributed Control System – Job Role Order

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**Fisher™ - Control Valve - Fundamentals**<br>**CEUs - .4**

**Overview**
This curriculum contains e1500, e1501, e1502, and e1503 - the course group introduces the basic terminology of control devices: including control valve types, uses, roles, flow characteristics and to the various entities that define codes and standards for control devices. Sliding stem, rotary, and the basics of an actuator, lists the types of actuators for sliding stem and rotary control valves, states the general components of an actuator and lists general actuator selection guidelines.

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**Fisher™ - Valve Trim and Body Maintenance - 1400**<br>**CEUs – 2.1**

**Overview**
This 3-day course and hands-on workshop explains how valves and actuators function and how they are installed and calibrated. It emphasizes installation, troubleshooting, parts replacement, and calibration of control valves, actuators, and FIELDVUE™ digital valve controllers. Those who complete this course will be able to:
- Correctly perform installation procedures
- Perform basic troubleshooting
- Properly apply and calibrate Fisher FIELDVUE DVC6200 digital valve controllers
- Change valve trim, gaskets and packing

**Topics**
- Control valve terminology
- Globe valves
- Packing
- Actuators, and digital valve controllers
- Bench set
- Seat leak testing
- Ball valves
- Butterfly valves
- Eccentric disc valves
- Valve characteristics

**Delivery Options**
This training is also available as a remote virtual classroom course 1400V.

**Audience**
This introductory course is for valve mechanics, maintenance personnel, instrument technicians, and others who are responsible for maintaining control valves, actuators and control valve instrumentation.

**Prerequisites**
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.

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**Fisher™ - Valve Trim & Body Maintenance - 1400V**<br>**CEUs – 1.0**

**Overview**
This 10-hour remote virtual classroom course event consists of 5 virtual classroom parts, 2 hours for each part. It explains how valves and actuators function and how they are installed and calibrated. It emphasizes installation, troubleshooting, parts replacement, and calibration of control valves, actuators, and FIELDVUE™ digital valve controllers. Students also have the option to attend a corresponding hands-on workshop, 1401W, following the completion of the virtual classroom portion of this course. Students who complete this course will be able to:
- Correctly perform installation procedures
- Perform basic troubleshooting
- Properly apply and calibrate Fisher FIELDVUE DVC6200 digital valve controllers
- Change valve trim, gaskets and packing

**Topics**
- Control valve terminology
- Globe valves
- Packing
- Actuators, and digital valve controllers
- Bench set
- Seat leak testing
- Ball valves
- Butterfly valves
- Eccentric disc valves
- Valve characteristics

**Delivery Options**
This training is also available as an Instructor Led course 1400.

**Audience**
This introductory course is for valve mechanics, maintenance personnel, instrument technicians, and others who are responsible for maintaining control valves, actuators and control valve instrumentation.

**Prerequisites**
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.
Fisher™ - Valve Trim & Body Maintenance Hands-on Workshop – 1400W CEUs – .8

Overview
This is an 8-hour workshop is offered as an optional component following the 1400V remote virtual classroom event. Students will have the opportunity to perform hands on exercises on control valve bodies and actuators that reinforce the maintenance topics that were discussed during the online portion of the course. The workshop is hosted in Marshalltown, IA and a workshop facilitator will be present to assist the students with any questions they may have while performing the exercises.

Workshops
- Fisher easy-e™ valve trim maintenance and repair
- Fisher sliding stem valve packing replacement
- Fisher Sliding stem actuator maintenance and repair
- Fisher 657 and 667 actuator bench set
- Fisher butterfly valve maintenance and repair
- Fisher ball valve maintenance and repair
- Fisher eccentric plug valve maintenance and repair
- Fisher rotary shaft valve packing replacement
- Fisher rotary actuator maintenance and repair
- Fisher rotary valve and actuator mounting

Audience
This workshop is intended for any students that have completed the online component of the 1400V course and would like to gain some hands-on experience working with the control valve assemblies.

Prerequisites
Must have successfully completed the 1400V course.

Fisher™ - Control Valve Instrument Maintenance and Calibration – 1700 CEUs – 2.1

Overview
This 3-day course and hands-on workshop covers the principles of operation, calibration and installation procedures for electronic and pneumatic instruments. The class will discuss maintenance procedures for Fisher sliding stem and rotary actuator assemblies. Hands on workshop exercises and lectures to discuss the operation and calibration of many Fisher instruments such as I/P transducers, pneumatic positioners, electro-pneumatic positioners, and Fisher FIELDVUE™ digital valve controllers will be covered. Students will:
- Calibrate a variety of pneumatic and electronic instruments
- Correctly perform installation procedures
- Perform basic troubleshooting of control valve instruments

Topics
- Actuators and bench set
- Current to pneumatic (I/P) transducers
- Instrument terminology
- Pneumatic and electro-pneumatic positioners
- Fisher FIELDVUE digital valve controller

Delivery Options
This training is also available as a remote virtual classroom course 1700V.

Audience
This course is for instrument technicians and others, responsible for pneumatic and electronic instrument calibration, installation and troubleshooting.

Prerequisites
Some experience in electronic and pneumatic instrument maintenance and calibration would be helpful.

Fisher™ - Control Valve Instrument - Maintenance & Calibration – 1700V CEUs – .8

Overview
This 8-hour remote virtual classroom course event consists of 4 virtual classroom parts, 2 hours for each part. It will explain the technical operation and maintenance of both sliding stem and rotary actuators. Also discussed will be the design, operation, and calibration principles for both sliding stem and rotary pneumatic positioners. Finally, the course will cover the basic operation and calibration principles for Fisher FIELDVUE digital valve controllers. Fisher documentation will be referenced and used to perform calibration procedures during live interactive sessions. Students also have the option to attend a corresponding hands-on workshop, 1700W, following the completion of the virtual classroom portion of this course.

- Identify and discuss operation principles of Fisher actuators
- Identify and discuss operation principles of Fisher pneumatic positioners
- Identify and discuss operation principles of Fisher I/P transducers
- Identify and discuss operation principles of Fisher FIELDVUE digital valve controllers

Topics
- Maintaining Fisher actuators
- Mounting and calibrating Fisher i2P-100
- Mounting and calibrating Fisher 3582 positioners
- Mounting and calibrating Fisher 3610J and 3610JP positioners
- Mounting and calibrating Fisher FIELDVUE digital valve controllers

Delivery Options
This training is also available as an Instructor Led course 1700.

Audience
This course offers a technical perspective for the working of Fisher positioners for control valve operation. The course is especially useful to anyone with responsibilities to repair, maintain, and calibrate valve positioners.

Prerequisites
Some experience with industrial control equipment including control valves and actuators would be helpful.
Overview
This is an 8-hour workshop that is offered as an optional component following the 1700V virtual classroom event. Students will have the opportunity to perform hands-on exercises on control valve actuators and instrumentation that reinforce the maintenance topics that were discussed during the online portion of the course. The workshop is hosted in Marshalltown, IA and a workshop facilitator will be present to assist the students with any questions they may have while performing the exercises.

Workshops
- Fisher sliding stem actuator maintenance and repair
- Fisher 657 and 667 actuator bench set
- Fisher rotary actuator maintenance and repair
- Fisher rotary valve and actuator mounting
- Fisher I/P transducer maintenance and calibration
- Fisher 3582 positioner maintenance and calibration
- Fisher 3610 and 3610JP positioner maintenance and calibration
- Fisher FIELDVUE DVC6200 digital valve controller maintenance and calibration

Audience
This workshop is intended for any students that have completed the online component of the 1700V course and would like to gain some hands-on experience working with the control valve assemblies.

Prerequisites
Must have successfully completed the 1700V course.

Fisher™ - Control Valve Instrument Troubleshooting – 1450 CEUs – 2.1

Overview
This 3-day course uses a very hands-on approach for troubleshooting and correcting many common control valve problems. The class will be introduced to the practice of basic valve sizing and selection. Valve problems such as cavitation, flashing, and aerodynamic noise are also discussed as well as common solutions to these problems using different control valve trims and materials. Instrumentation topics are expanded from course 1400/1400V and 1700/1700V to include troubleshooting and advanced calibration for split ranging, non-compatible signals, or using additional instruments such as a volume booster and trip valves. Loop performance issues due to stick-slip, high friction, and instrument operation are discussed.

Topics
- Control loop basics
- Influences on loop performance
- Control valve selection and sizing
- Valve troubleshooting
- Actuator troubleshooting
- Instrument selection
- Basic instrument troubleshooting
- Severe service considerations

Audience
This course is for experienced valve mechanics and maintenance personnel, instrument technicians, and others who will benefit from a broadened perspective of control valve performance and effect on total loop operation.

Prerequisites
Completion of courses 1400 or 1400V (with 1400W) and 1700 or 1700V (with 1700W).

Fisher™ - Pneumatic Pressure Controller - Maintenance & Calibration – 1720V CEUs - .4

Overview
This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours for each part. It will explain the technical operation and maintenance of pneumatic pressure controllers and explain the basics of the proportional, integral, and derivative response. Maintenance of common components such as bourdon tubes and bellows elements will be discussed along with the proper procedures for calibrating various Fisher controllers.

- Fisher C1 pressure controller
- Fisher 4150/4160 pressure controller
- Fisher type 4195 pressure controller

Topics
- PID Actions
- Operational overview
- Zero and Span Calibration
- Changing control action
- Bourdon tube replacement C1/4150/4160
- Linkage adjustment 4195
- Flapper Leveling 4195

Audience
This course offers a technical perspective of the working of Fisher pneumatic pressure controllers. The course is especially useful to anyone with responsibilities to repair, maintain, calibrate, and tune pressure controllers.

Prerequisites
None, however some experience and familiarity to process control and general valve operation is recommended.
Fisher™ - Pneumatic Level Controller - Maintenance & Calibration – 1730V
CEUs - .4

Overview
This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours for each part. It will explain the technical operation and maintenance of pneumatic level controllers and transmitters. A detailed overview of displacer based level methods for applications including single fluid level, interface, and density will be covered. Basics of proportional, integral, and derivative actions are discussed as well as the proper procedures for mounting, calibrating and configuring the devices.

• Fisher 249 Displacer Sensors
• Fisher 2500 level controller
• Fisher 2502 level controller

Topics
• Common level measurement methods
• Displacer basics
• Torque tube construction
• Fisher 249 displacer sensor maintenance
• Mounting and calibrating Fisher 2500
• Mounting and calibrating Fisher 2502

Audience
This course offers a technical perspective of Fisher pneumatic level controller and transmitter operation. The course is especially useful to anyone with responsibilities to repair, maintain, calibrate, and tune level controllers and transmitters.

Prerequisites
None, however some experience and familiarity to process control and general valve operation is recommended.

Fisher™ - FIELDVUE™ DLC3010 Digital Level Controller Maintenance and Calibration – 1731V
CEUs - .4

Overview
This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours for each part. This course will explain the technical operation and maintenance of FIELDVUE digital level controllers. An overview of displacer based level methods for applications including single fluid level, interface, and density will be covered. The class will also discuss connecting to the device and using AMS™ Device Manager software or a field communicator to perform configuration and calibrations procedures.

• Fisher 249 Displacer Sensors
• Fisher FIELDVUE DLC3010

Topics
• Displacer basics
• Torque tube construction
• Fisher 249 displacer sensor maintenance
• Mounting Fisher FIELDVUE DLC3010
• Configure FIELDVUE DLC3010 using guided setup for level
• Configure the FIELDVUE DLC3010 for interface applications

Audience
This course offers a technical perspective of the Fisher™ FIELDVUE digital level controller DLC3010. The course is especially useful to anyone with responsibilities to repair, maintain, and calibrate FIELDVUE digital level controllers.

Prerequisites
None, however some experience and familiarity to process control and general valve operation is recommended. Completion of 1730V is strongly encouraged.

Fisher™ - Simulated Controller Tuning – 9006V
CEUs - .8

Overview
This 8-hour virtual classroom course event consists of 4 parts, 2 hours for each part. Students will be introduced to the fundamentals of PID control. The control and response characteristic of each PID component will be explained and students will have the opportunity to see their effect using simulated loop software accessed through a virtual machine. Using the software, the class will also work through and discuss different strategies for tuning various process loops. These strategies include non-calculation based methods like trial and error, as well as, calculation based methods such as lambda tuning.

Topics
• Elements of PID control
• Load upsets; process noise
• Self-regulating process
• Integrating process
• Valve dead band and stick/slip
• Limit cycling
• Trial and error tuning
• Lambda tuning

Delivery Options
This training is also available as an Instructor Led course 9006.

Audience
This course is designed for those who have the job responsibility of tuning or monitoring industrial process control loops. Students will learn to tune controllers to meet the needs of each loop.

Prerequisites
Some basic understanding of process measurement and control is recommended.
Fisher™ - Fundamentals of HART® Based FIELDVUE™ Digital Valve Controllers using Emerson Field Communicators and ValveLink™ Mobile – 1751
CEUs – 2.1

Overview
This 3-day course provides hands-on experience working with FIELDVUE digital valve controllers using an Emerson 475 or AMS Trex™ Communicator. The class will discuss basic operation and installation of the FIELDVUE digital valve controllers. Students will practice installing and mounting FIELDVUE digital valve controllers onto sliding stem and rotary control valve assemblies, as well as perform basic configuration and calibration of FIELDVUE Instruments. Troubleshooting the digital valve controller using ValveLink™ Mobile software will be performed and basic data interpretation will be introduced.

Topics
- FIELDVUE digital valve controller theory of operation
- FIELDVUE instrument installation
- Diagnostic troubleshooting and data interpretation using ValveLink Mobile with AD and PD tier devices

Audience
This course is for technicians, engineers and others responsible for installing, calibrating and basic troubleshooting Fisher FIELDVUE instruments using the Emerson Field Communicators with ValveLink Mobile.

Prerequisites
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.

Fisher™ - ValveLink™ Solo Software for Configuration and Calibration of FIELDVUE™ Digital Valve Controllers – 1752
CEUs – 2.1

Overview
This 3-day course provides hands-on experience working with FIELDVUE digital valve controllers and ValveLink software. Students will be able to execute ValveLink software calibration and diagnostic routines and create an instrument database.

Topics
- Introduction to ValveLink Solo software
- Configuration with ValveLink software
- Calibration with ValveLink software
- ValveLink software advanced and performance Tier Diagnostics
- Troubleshooting
- Introduction to diagnostic data interpretation

Delivery Options
This training is also available as a remote virtual classroom course training by attending courses 1760V, 1761V, 1762V, and 1763V

Audience
This course is for technicians, engineers and others responsible for installation, calibration and diagnostics for FIELDVUE digital valve controllers and ValveLink software. The primary focus of this course is to provide a comprehensive experience in managing digital valve controllers using the ValveLink software.

Prerequisites
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.

Fisher™ - FIELDVUE™ Digital Valve Controllers – 1760V
CEUs - .4

Overview
This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours for each part. It covers detailed operation of Fisher FIELDVUE digital valve controllers. Class discussions are centered on what individual components within a digital valve controller are, and how they can affect overall control valve performance. Common maintenance practices are detailed, and include proper care and handling of internal components, such as the I/P and Relay. Calibration procedures of the FIELDVUE DVC6200 digital valve controller will be conveyed using ValveLink™ software connected to a live device. Course focus includes:
- Identify and understand components of a digital valve controller
- Describe and demonstrate proper instrument mounting
- Connect to a live device using ValveLink Software
- Discuss and perform a guided setup routine
- Discuss and perform an auto travel calibration routine

Topics
- Pneumatic instrument principle overview
- Operation of a FIELDVUE digital valve controller for travel control
- Operation of a FIELDVUE digital valve controller for pressure control
- Replacing FIELDVUE digital valve controller components
- Mounting a FIELDVUE digital valve controller
- Calibrating a FIELDVUE digital valve controller

Audience
This course is designed for those who have the job responsibility to repair, mount, configure, and calibrate Fisher FIELDVUE digital valve controllers.

Prerequisites
Experience and familiarity of process control and general valve operation is recommended. Completion of course 1700 or 1700V is strongly encouraged.
Successful completion of 1760 Prerequisites controllers with HC tier.
troubleshooting of FIELD
the job responsibility to perform detailed
This course is designed for those who have
Audience

Overview
This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours for each part. It covers the detailed setup of the FIELDVUE digital valve controllers. The class will discuss navigating through the detailed setup menus to change device operation and configuration parameters, as well as set alerts and alarms and correctly complete the device specification sheet. Students will have access to a live FIELDVUE DVC6200 using ValveLink™ software. In conjunction with HC tiering capabilities, a basic understanding of functions and troubleshooting within ValveLink software is discussed at length. Course focus includes:

- Detailed Setup - basic page group
- Detailed Setup - alert page group
- Detailed Setup - specification sheet
- Status Monitor
- Stroke Valve Test

Topics
- Saving device configuration as found
- Viewing device datasets
- Comparing current datasets to historical datasets
- Restoring historical datasets
- Using status monitor
- Interpreting data from status monitor
- Performing a stroke valve test

Audience
This course is designed for those who have the job responsibility to perform detailed configurations and basic diagnostic troubleshooting of FIELDVUE digital valve controllers with HC tier.

Prerequisites
Successful completion of 1760V is required.

Fisher™ - FIELDVUE™ Digital Valve Controller - Advanced Diagnostics (AD) Tier – 1762V CEUs - .4

Overview
This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours each part. It introduces data collection methods for offline diagnostic testing and troubleshooting of the FIELDVUE digital valve controllers with Advanced Diagnostic (AD) Tier. Students will have access to a live FIELDVUE DVC6200 using ValveLink™ software, and will discuss the proper setup and execution of diagnostic functionality within the AD tier. Dynamic scan and step response tests will be conducted, and the class will interpret analyzed data and review the details of diagnostic graphs for each. Areas of focus for AD diagnostic functionality include:

- Step Response Test - stroking speed
- Step Response Test - 9-point step test
- Step Response Test - performance test
- Step Response Test – 3-point ramp
- Step Response Test - supply pressure
- Step Response Test - drive signal
- Valve Signature - graph and analyzed data
- Dynamic Error Band
- Drive Signal

Topics
- Verifying specification sheet information
- Viewing/initializing AD related diagnostic information
- Identifying common features of diagnostic graphs
- Interpreting AD tier diagnostics

Audience
This course is designed for those with job responsibilities to configure and perform diagnostic tests as well as interpret diagnostic data of the FIELDVUE digital valve controller with AD tiering.

Prerequisites
Successful completion of 1760V and 1761V is required.

Fisher™ - FIELDVUE™ Digital Valve Controller – Performance Diagnostics (PD) Tier – 1763V CEUs - .4

Overview
This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours each part. It introduces data collection methods for online diagnostic testing and troubleshooting of the FIELDVUE digital valve controllers with Performance Diagnostic (PD) Tier. Students will have access to a live FIELDVUE DVC6200 device using ValveLink™ software, and will discuss the proper setup and execution of diagnostic functionality within the PD tier. Permanent tiering step-up options are discussed, including the free one-time step up to PD tier, as well as specific procedures to follow when changing a digital valve controller’s diagnostic tier. Diagnostic functions of interest include:

- PD One Button
- Profiles
- Triggered Profiles
- Friction
- Friction Trends

Topics
- Verifying specification sheet information
- Running a PD One Button Test
- Viewing/analyzing PD related diagnostic information
- Configuring scheduler to run diagnostics
- Configuring/Activating trending and network alert scan functions
- Understanding digital valve controller diagnostic tiering levels

Audience
This course is designed for those with job responsibilities to perform and interpret online diagnostic tests associated with the FIELDVUE digital valve controller with PD tiering.

Prerequisites
Successful completion of 176V, 1761V, and 1762V is required.
Overview
This 3-day course reviews the role and function of control valve positioners followed by a series of hands-on exercises to disassemble, inspect, assemble, install, and commission a FOUNDATION fieldbus FIELDVUE digital valve controller. During commissioning, students will learn the basics of the FOUNDATION fieldbus protocol, the role of function blocks, addressing, modes and status. Students will configure, calibrate, and commission devices using Emerson Communicator and ValveLink™ Solo software. Hands-on exercises also teach students how to perform detailed setup routines and how to run and collect data for various ValveLink software diagnostics.

Topics
- Positioner Basics
- FOUNDATION fieldbus overview
- FIELDVUE digital valve controller installation and mounting
- Modes and status
- Configuration and calibration with the 475 or AMS Trex™ Communicator and ValveLink Mobile
- ValveLink™ software guided Setup /Detailed Setup
- Tuning
- Tag management
- Pressure control
- ValveLink software diagnostics
- FIELDVUE instrument troubleshooting

Audience
This course teaches technicians and engineers the basics of FOUNDATION fieldbus digital valve controller installation, configuration, calibration, and troubleshooting.

Prerequisites
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.
Fisher™ - Control Valve Engineering I – 1300
CEUs – 2.1

Overview
This 3-day course reviews design and operating principles of control valves, actuators, positioners and related accessories. Students will solve several demonstration sizing and selection problems using Fisher Specification Manager software and published materials, plus participate in equipment demonstrations and hands-on workshops. Students who complete this course will:
- Select the proper valve characteristic for a given process
- Choose suitable styles of control valves for an application
- Size control valves and actuators
- Properly apply positioners and instruments

Topics
- Control valve selection: rotary/sliding stem
- Actuator selection and sizing
- Liquid valve sizing
- Gas valve sizing
- Positioners and transducers
- Valve guidelines
- Valve characteristics
- Valve packing considerations

Delivery Options
This training is also available as a remote virtual classroom course 1300V.

Audience
This course is for engineers, technicians and others responsible for the selection, sizing, and application of control valves, actuators and control valve instrumentation.

Prerequisites
Some experience with industrial control equipment including control valves and actuators would be helpful.

Fisher™ – Control Valve Engineering I – 1300V
CEUs – 1.6

Overview
This 16-hour remote virtual classroom course event consists of 8 virtual classroom parts, 2 hours for each part. It reviews design and operating principles of control valves, actuators, positioners and related accessories. It describes the sizing and selection methods for a broad variety of control valves assemblies. Students will solve several demonstration sizing and selection problems using Fisher Specification Manager software and published materials. Students who complete this course will:
- Select the proper valve characteristic for a given process
- Choose suitable styles of control valves for an application
- Size control valves and actuators
- Properly apply positioners and instruments

Topics
- Control valve selection: rotary/sliding stem
- Actuator selection and sizing
- Liquid valve sizing
- Gas valve sizing
- Positioners and transducers
- Valve guidelines
- Valve characteristics
- Valve packing considerations

Delivery Options:
This training is also available as an Instructor Led course 1300.

Audience
This course is specifically tailored to technicians, engineers and others responsible for the proper selection, sizing, and application of control valve assemblies.

Prerequisites
Some experience with industrial control equipment including control valves and actuators would be helpful.
Fisher™ - Simulated Controller Tuning – 9006V
CEUs - .8

Overview
This 8-hour virtual classroom course event consists of 4 parts, 2 hours for each part. Students will be introduced to the fundamentals of PID control. The control and response characteristic of each PID component will be explained and students will have the opportunity to see their effect using simulated loop software accessed through a virtual machine. Using the software, the class will also work through and discuss different strategies for tuning various process loops. These strategies include non-calculation based methods like trial and error, as well as, calculation based methods such as lambda tuning.

Topics
- Elements of PID control
- Load upsets; process noise
- Self-regulating process
- Integrating process
- Valve dead band and stick/slip
- Limit cycling
- Trial and error tuning
- Lambda tuning

Delivery Options
This training is also available as an Instructor Led course 9006.

Audience
This course is designed for those who have the job responsibility of tuning or monitoring industrial process control loops. Students will learn to tune controllers to meet the needs of each loop.

Prerequisites
Some basic understanding of process measurement and control is recommended.

Fisher™ - Control Valve Engineering II - 1325V – Continued...

Overview
This 8-hour remote virtual classroom course event consists of 4 virtual classroom parts, 2 hours for each part. It reviews design and operating principles of control valves in various applications. It describes the sizing and selection methods utilized in selecting appropriate control valve assemblies, as they relate to severe service applications such as noise and cavitation. Students will solve several advanced sizing and selection problems using Fisher Specification Manager software and published materials. Students will also have the opportunity to ask Emerson certified instructors for Fisher

Fisher™ - Control Valve Engineering II - 1325V – Continued...

engineering courses to clarify questions and assist in better understanding of these advanced fluid mechanic ideas. Students who successfully complete this course will:

- Size control valves and trim for a cavitation application
- Size control valves and trim for a noisy application
- Choose suitable styles of control valves for an application
- Size control valves for an erosive and/or corrosive application
- Properly apply knowledge learned from 1300 or 1300V

Topics
- Cavitation and flashing
- Noise
- Corrosion
- Erosion
- Valve application guidelines

Audience
This course is designed for engineers, technicians and others responsible for the selection, sizing, and application of control valve assemblies.

Prerequisites
Successful completion of 1300V or 1300 is required. Familiarity with sizing, selection, and advanced applications of control valves is strongly encouraged.

Fisher™ - Control Valve Engineering III – 1350
CEUs – 2.1

Overview
This 3-day course reviews advanced application-specific design and operating principles of control valve assemblies, instruments, and accessories installed in a variety of non-general service applications. Students will gain insight in sizing and selection methods utilized in selecting appropriate control valve assemblies, as they relate to advanced control topics. Fisher Specification Manager software, combined with published reference materials, will be used to solve several advanced sizing and selection problems. Students will also have the opportunity to ask Emerson certified Fisher engineering instructors clarifying questions to firmly understand the advanced fluid mechanics covered in this course. Students who successfully complete the course will:

- Properly apply knowledge learned from 1300/1300V and 1325V
- Review basic sizing of control valves and build on the complexity of applications

Topics
- Cavitation and flashing
- Noise
- Basic thermodynamics
- Cryogenic valves
- Two-phase flow
- Stroking speed
- Steam conditioning
- Control valve optimum loop performance
- Control Valve Diagnostic Basics

Delivery Options
This training is also available as a remote virtual classroom course 1350V.

Audience
This course is specifically tailored to technicians, engineers and others responsible for the proper selection, sizing, and application of control valve assemblies.

Prerequisites
Successful completion of 1300 or 1300V and 1325V is required. Familiarity with sizing, selection, and advanced application of control valves is strongly encouraged.
**Overview**
This 16-hour remote virtual classroom course event consists of 8 virtual classroom, 2 hour for each part. It reviews advanced application specific design and operating principles of control valve assemblies, instruments, and accessories installed in a variety of non-general service applications.

Students will gain insight in sizing and selection methods utilized in selecting appropriate control valve assemblies, as they relate to advanced control topics. Fisher Specification Manager software, combined with published reference materials, will be used to solve several advanced sizing and selection problems. Students will also have the opportunity to ask Emerson certified Fisher engineering instructors clarifying questions to firmly understand the advanced fluid mechanics covered in this course. Students who successfully complete the course will:
- Properly apply knowledge learned from 1300 or 1300V and 1325V
- Review basic sizing of control valves and build on the complexity of applications
- Review basics of thermodynamics and how those concepts relate to the sizing model
- Discuss key ideas relating cryogenic control valve assembly applications
- Size and select control valves for twophase flow of hydrocarbon mixtures and dissolved gas
- Size and select actuators and pneumatic accessories for stroking speed requirements
- Gain insight into instrument diagnostics and optimum loop performance
- Learn the basics of steam conditioning processes and associated equipment

**Topics**
- Cavitation and flashing
- Noise
- Basic thermodynamics
- Cryogenic valves
- Two-phase flow
- Stroking speed
- Steam conditioning
- Control valve optimum loop performance
- Control Valve Diagnostic Basics

**Delivery Options**
This training is also available as an Instructor Led course 1350.

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**Fisher™ - ValveLink™ Solo Software for Configuration and Calibration of FIELDVUE™ Digital Valve Controllers – 1752 CEUs – 2.1**

**Overview**
This 3-day course provides hands-on experience working with FIELDVUE digital valve controllers and ValveLink software. Students will be able to execute ValveLink software calibration and diagnostic routines, and create an instrument database.

**Topics**
- Introduction to ValveLink Solo software
- Configuration with ValveLink software
- Calibration with ValveLink software
- ValveLink software advanced and performance Tier Diagnostics
- Troubleshooting
- Introduction to diagnostic data interpretation

**Delivery Options**
This training is also available as a remote virtual classroom course training by attending courses 1760V, 1761V, 1762V, and 1763V

**Audience**
This course is designed for those who have the job responsibility to repair, mount, configure, and calibrate Fisher FIELDVUE digital valve controllers. Class discussions are centered on what individual components within a digital valve controller are, and how they can affect overall control valve performance. Common maintenance practices are detailed, and include proper care and handling of internal components, such as the I/P and Relay. Calibration procedures of the FIELDVUE DVC6200 digital valve controller will be conveyed using ValveLink™ software connected to a live device. Course focus includes:
- Identify and understand components of a digital valve controller
- Describe and demonstrate proper instrument mounting
- Connect to a live device using ValveLink Software
- Discuss and perform a guided setup routine
- Discuss and perform an auto travel calibration routine

**Prerequisites**
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.
### Overview

This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours for each part. It covers the detailed setup of the FIELDVUE digital valve controllers. The class will discuss navigating through the detailed setup menus to change device operation and configuration parameters, as well as set alerts and alarms and correctly complete the device specification sheet. Students will have access to a live FIELDVUE DVC6200 using ValveLink™ software. In conjunction with HC tiering capabilities, a basic understanding of functions and troubleshooting within ValveLink software is discussed at length. Course focus includes:

- Detailed Setup - basic page group
- Detailed Setup - alert page group
- Detailed Setup - specification sheet
- Status Monitor
- Stroke Valve Test

### Topics

- Saving device configuration as found
- Viewing device datasets
- Comparing current datasets to historical datasets
- Restoring historical datasets
- Using status monitor
- Interpreting data from status monitor

### Audience

This course is designed for those who have the job responsibility to perform detailed configurations and basic diagnostic troubleshooting of FIELDVUE digital valve controllers with HC tier.

### Prerequisites

Successful completion of 1760V is required.

### Overview

This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours for each part. It introduces data collection methods for offline diagnostic testing and troubleshooting of the FIELDVUE digital valve controllers with Advanced Diagnostic (AD) Tier. Students will have access to a live FIELDVUE DVC6200 using ValveLink™ software, and will discuss the proper setup and execution of diagnostic functionality within the AD tier. Dynamic scan and step response tests will be conducted, and the class will interpret analyzed data and review the details of diagnostic graphs for each. Areas of focus for AD diagnostic functionality include:

- Step Response Test - stroking speed
- Step Response Test - 9-point step test
- Step Response Test - performance test
- Step Response Test – 3-point ramp
- Step Response Test - supply pressure
- Step Response Test - drive signal
- Valve Signature - graph and analyzed data
- Dynamic Error Band
- Drive Signal

### Topics

- Verifying specification sheet information
- Viewing/initializing AD related diagnostic information
- Identifying common features of diagnostic graphs
- Interpreting AD tier diagnostics

### Audience

This course is designed for those with job responsibilities to configure and perform diagnostic tests as well as interpret diagnostic data of the FIELDVUE digital valve controller with AD tiering.

### Prerequisites

Successful completion of 1760V and 1761V is required.
**Fisher™ - FOUNDATION™ fieldbus FIELDVUE™ Digital Valve Controller – 7036 CEUs – 2.1**

**Overview**
This 3-day course reviews the role and function of control valve positioners followed by a series of hands-on exercises to disassemble, inspect, assemble, install, and commission a FOUNDATION fieldbus FIELDVUE digital valve controller. During commissioning, students will learn the basics of the FOUNDATION fieldbus protocol, the role of function blocks, addressing, modes and status. Students will configure, calibrate, and commission devices using Emerson Communicator and ValveLink™ Solo software. Hands-on exercises also teach students how to perform detailed setup routines and how to run and collect data for various ValveLink software diagnostics.

**Topics**
- Positioner Basics
- FOUNDATION fieldbus overview
- FIELDVUE digital valve controller installation and mounting
- Modes and status
- Configuration and calibration with the 475 or AMS Trex™ Communicator and ValveLink Mobile
- ValveLink™ software guided Setup /Detailed Setup
- Tuning
- Tag management
- Pressure control
- ValveLink software diagnostics
- FIELDVUE instrument troubleshooting

**Audience**
This course teaches technicians and engineers the basics of FOUNDATION fieldbus digital valve controller installation, configuration, calibration, and troubleshooting.

**Prerequisites**
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.

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**Fisher™ - Fundamentals of HART® Based FIELDVUE™ Digital Valve Controllers using Emerson Field Communicators and ValveLink™ Mobile – 1751 CEUs – 2.1**

**Overview**
This 3-day course provides hands-on experience working with FIELDVUE digital valve controllers using an Emerson 475 or AMS Trex™ Communicator. The class will discuss basic operation and installation of the FIELDVUE digital valve controllers. Students will practice installing and mounting FIELDVUE digital valve controllers onto sliding stem and rotary control valve assemblies, as well as perform basic configuration and calibration of FIELDVUE Instruments. Troubleshooting the digital valve controller using ValveLink™ Mobile software will be performed and basic data interpretation will be introduced.

**Topics**
- FIELDVUE digital valve controller theory of operation
- FIELDVUE instrument installation
- Diagnostic troubleshooting and data interpretation using ValveLink Mobile with AD and PD tier devices

**Audience**
This course is for technicians, engineers and others responsible for installing, calibrating and basic troubleshooting Fisher FIELDVUE instruments using the Emerson Field Communicators with ValveLink Mobile.

**Prerequisites**
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.
Fisher™ Valve Learning Path

Valve Diagnostics

- Fisher™ Valve Learning Path
  - Valve Diagnostics
    - Fisher™ Valve Trim and Body Maintenance - 1400
      - CEUs – 2.1
        - Overview
          - This 3-day course and hands-on workshop explains how valves and actuators function and how they are installed and calibrated. It emphasizes installation, troubleshooting, parts replacement, and calibration of control valves, actuators, and FIELDVUE™ digital valve controllers. Those who complete this course will be able to:
            - Correctly perform installation procedures
            - Perform basic troubleshooting
            - Properly apply and calibrate Fisher FIELDVUE DVC6200 digital valve controllers
            - Change valve trim, gaskets and packing
        - Topics
          - Control valve terminology
          - Globe valves
          - Packing
          - Actuators, and digital valve controllers
          - Bench set
          - Seat leak testing
          - Ball valves
          - Butterfly valves
          - Eccentric disc valves
          - Valve characteristics
        - Delivery Options
          - This training is also available as a remote virtual classroom course 1400V.
        - Audience
          - This introductory course is for valve mechanics, maintenance personnel, instrument technicians, and others who are responsible for maintaining control valves, actuators and control valve instrumentation.
        - Prerequisites
          - Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.

- Fisher™ Valve Trim & Body Maintenance – 1400V
  - CEUs – 1.0
    - Overview
      - This 10-hour remote virtual classroom course event consists of 5 virtual classroom parts, 2 hours for each part. It explains how valves and actuators function and how they are installed and calibrated. It emphasizes installation, troubleshooting, parts replacement, and calibration of control valves, actuators, and FIELDVUE™ digital valve controllers. Students also have the option to attend a corresponding hands-on workshop, 1401W, following the completion of the virtual classroom portion of this course. Students who complete this course will be able to:
            - Correctly perform installation procedures
            - Perform basic troubleshooting
            - Properly apply and calibrate Fisher FIELDVUE DVC6200 digital valve controllers
            - Change valve trim, gaskets and packing
        - Topics
          - Control valve terminology
          - Globe valves
          - Packing
          - Actuators, and digital valve controllers
          - Bench set
          - Seat leak testing
          - Ball valves
          - Butterfly valves
          - Eccentric disc valves
        - Delivery Options
          - This training is also available as an Instructor Led course 1400.
        - Audience
          - This introductory course is for valve mechanics, maintenance personnel, instrument technicians, and others who are responsible for maintaining control valves, actuators and control valve instrumentation.
        - Prerequisites
          - Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.

- Fisher™ Control Valve - Fundamentals - c1500
  - CEUs - .4
    - Overview
      - This curriculum contains e1500, e1501, e1502, and e1503 - the course group introduces the basic terminology of control devices: including control valve types, uses, roles, flow characteristics and to the various entities that define codes and standards for control devices. Sliding stem, rotary, and the basics of an actuator, lists the types of actuators for sliding stem and rotary control valves, states the general components of an actuator and lists general actuator selection guidelines.
Fisher™ - Valve Trim & Body
Maintenance Hands-on Workshop – 1400V
CEUs – .8

Overview
This is an 8-hour workshop that can be offered as an optional component following the 1400V remote virtual classroom event. Students will have the opportunity to perform hands-on exercises on control valve bodies and actuators to reinforce the maintenance topics that were discussed during the online portion of the course. The workshop is hosted in Marshalltown, IA and a workshop facilitator will be present to assist the students with any questions they may have while performing the exercises.

Workshops
- Fisher easy-™ valve trim maintenance and repair
- Fisher sliding stem valve packing replacement
- Fisher Sliding stem actuator maintenance and repair
- Fisher 657 and 667 actuator bench set
- Fisher butterfly valve maintenance and repair
- Fisher ball valve maintenance and repair
- Fisher eccentric plug valve maintenance and repair
- Fisher rotary shaft valve packing replacement
- Fisher rotary actuator maintenance and repair
- Fisher rotary valve and actuator mounting

Audience
This workshop is intended for any students that have completed the online component of the 1400V course and would like to gain some hands-on experience working with the control valve assemblies.

Prerequisites
Must have successfully completed the 1400V course.

Fisher™ - Control Valve Instrument Maintenance and Calibration – 1700V
CEUs – 2.1

Overview
This 3-day course and hands-on workshop covers the principles of operation, calibration and installation procedures for electronic and pneumatic instruments. The course will take place during the 1700V workshop and will consist of hands-on workshop exercises and lectures to discuss the operation and calibration of many Fisher instruments such as I/P transducers, pneumatic positioners, electro-pneumatic positioners, and Fisher FIELDVUE™ digital valve controllers. Students will:
- Calibrate a variety of pneumatic and electronic instruments
- Correctly perform installation procedures
- Perform basic troubleshooting of control valve instruments

Topics
- Actuators and bench set
- Current to pneumatic (I/P) transducers
- Instrument terminology
- Pneumatic and electro-pneumatic positioners
- Fisher FIELDVUE digital valve controller

Delivery Options
This training is also available as a remote virtual classroom course 1700V.

Audience
This course is for instrument technicians and others, responsible for pneumatic and electronic instrument calibration, installation and troubleshooting.

Prerequisites
Some experience in electronic and pneumatic instrument maintenance and calibration would be helpful.

Fisher™ - Control Valve Instrument - Maintenance & Calibration – 1700V
CEUs – .8

Overview
This 8-hour remote virtual classroom course event consists of 4 virtual classroom parts, 2 hours for each part. It will explain the technical operation and maintenance of both sliding stem and rotary actuators. Also discussed will be the design, operation, and calibration principles for both sliding stem and rotary pneumatic positioners. Finally, the course will cover the basic operation and calibration principles for Fisher FIELDVUE digital valve controllers. Fisher documentation will be referenced and used to perform calibration procedures during live interactive sessions. Students also have the option to attend a corresponding hands-on workshop, 1700W, following the completion of the virtual classroom portion of this course.

Topics
- Identify and discuss operation principles of Fisher actuators
- Identify and discuss operation principles of Fisher pneumatic positioners
- Identify and discuss operation principles of Fisher I/P transducers
- Identify and discuss operation principles of Fisher FIELDVUE digital valve controllers

Delivery Options
This training is also available as an Instructor Led course 1700.

Audience
This course offers a technical perspective for the working of Fisher positioners for control valve operation. The course is especially useful to anyone with responsibilities to repair, maintain, and calibrate valve positioners.

Prerequisites
Some experience with industrial control equipment including control valves and actuators would be helpful.
Fisher™ - Control Valve Instrument - Maintenance & Calibration Hands-on Workshop - 1700W
CEUs – .8

Overview
This is an 8-hour workshop that is offered as an optional component following the 1700V virtual classroom event. Students will have the opportunity to perform hands-on exercises on control valve actuators and instrumentation that reinforce the maintenance topics that were discussed during the online portion of the course. The workshop is hosted in Marshalltown, IA and a workshop facilitator will be present to assist the students with any questions they may have while performing the exercises.

Workshops
• Fisher sliding stem actuator maintenance and repair
• Fisher 657 and 667 actuator bench set
• Fisher rotary actuator maintenance and repair
• Fisher rotary valve and actuator mounting
• Fisher I/P transducer maintenance and calibration
• Fisher 3582 positioner maintenance and calibration
• Fisher 3610U and 3610JP positioner maintenance and calibration
• Fisher FIELDVUE DVC6200 digital valve controller maintenance and calibration

Audience
This workshop is intended for any students who have completed the online component of the 1700V course and would like to gain some hands-on experience working with control valve assemblies.

Prerequisites
Must have successfully completed the 1700V course.

Fisher™ - Control Valve and Instrument Troubleshooting – 1450
CEUs – 2.1

Overview
This 3-day course uses a very hands-on approach for troubleshooting and correcting many common control valve problems. The class will be introduced to the practice of basic valve sizing and selection. Valve problems such as cavitation, flashing, and aerodynamic noise are also discussed as well as common solutions to these problems using different control valve trims and materials. Instrumentation topics are expanded from course 1400/1400V and 1700/1700V to include troubleshooting and advanced calibration for split ranging, non-compatible signals, or using additional instruments such as a volume booster and trip valves. Loop performance issues due to stick-slip, high friction, and instrument operation are discussed.

Topics
• Control loop basics
• Influences on loop performance
• Control valve selection and sizing
• Valve troubleshooting
• Actuator troubleshooting
• Instrument selection
• Basic instrument troubleshooting
• Severe service considerations

Audience
This course is for experienced valve mechanics and maintenance personnel, instrument technicians, and others who will benefit from a broadened perspective of control valve performance and effect on total loop operation.

Prerequisites
Completion of courses 1400 or 1400V (with 1400W) and 1700 or 1700V (with 1700W).

Fisher™ - Fundamentals of HART® Based FIELDVUE™ Digital Valve Controllers using Emerson Field Communicators and ValveLink™ Mobile – 1751
CEUs – 2.1

Overview
This 3-day course provides hands-on experience working with FIELDVUE digital valve controllers using an Emerson 475 or AMS Trex™ Communicator. The class will discuss basic operation and installation of the FIELDVUE digital valve controllers. Students will practice installing and mounting FIELDVUE digital valve controllers onto sliding stem and rotary control valve assemblies, as well as perform basic configuration and calibration of FIELDVUE Instruments. Troubleshooting the digital valve controller using ValveLink™ Mobile software will be performed and basic data interpretation will be introduced.

Topics
• FIELDVUE digital valve controller theory of operation
• FIELDVUE instrument installation
• Diagnostic troubleshooting and data interpretation using ValveLink Mobile with AD and PD tier devices

Audience
This course is for technicians, engineers and others responsible for installing, calibrating and basic troubleshooting Fisher FIELDVUE instruments using the Emerson Field Communicators with ValveLink Mobile.

Prerequisites
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.
Overview
This 3-day course provides hands-on experience working with FIELDVUE digital valve controllers and ValveLink software. Students will be able to execute ValveLink software calibration and diagnostic routines, and create an instrument database.

Topics
- Introduction to ValveLink Solo software
- Configuration with ValveLink software
- Calibrating with ValveLink software
- ValveLink software advanced and performance Tier Diagnostics
- Troubleshooting
- Introduction to diagnostic data interpretation

Delivery Options
This training is also available as a remote virtual classroom course training by attending courses 1760V, 1761V, 1762V, and 1763V.

Audience
This course is for technicians, engineers and others responsible for installation, calibration and diagnostics for FIELDVUE digital valve controllers and ValveLink software. The primary focus of this course is to provide a comprehensive experience in managing digital valve controllers using the ValveLink software.

Prerequisites
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.

Fisher™ - FIELDVUE™ Digital Valve Controllers – 1760V
CEUs - .4

Overview
This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours for each part. It covers detailed operation of Fisher FIELDVUE digital valve controllers. Class discussions are centered on what individual components within a digital valve controller are, and how they can affect overall control valve performance. Common maintenance practices are detailed, and include proper care and handling of internal components, such as the I/P and Relay. Calibration procedures of the FIELDVUE DVC6200 digital valve controller will be conveyed using ValveLink™ software connected to a live device. Course focus includes:
- Identify and understand components of a digital valve controller
- Describe and demonstrate proper instrument mounting
- Connect to a live device using ValveLink Software
- Discuss and perform a guided setup routine
- Discuss and perform an auto travel calibration routine

Topics
- Pneumatic instrument principle overview
- Operation of a FIELDVUE digital valve controller for travel control
- Operation of a FIELDVUE digital valve controller for pressure control
- Replacing FIELDVUE digital valve controller components
- Mounting a FIELDVUE digital valve controller
- Calibrating a FIELDVUE digital valve controller

Audience
This course is designed for those who have the job responsibility to perform detailed troubleshooting within ValveLink software is discussed at length. Course focus includes:
- Detailed Setup - basic page group
- Detailed Setup - alarm page group
- Detailed Setup - specification sheet
- Status Monitor
- Stroke Valve Test

Fisher™ - FIELDVUE™ Digital Valve Controller - HART® Communicating (HC) Tier – 1761V
CEUs - .4

Overview
This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours for each part. It covers the detailed setup of the FIELDVUE digital valve controllers. The class will discuss navigating through the detailed setup menus to change device operation and configuration parameters, as well as set alerts and alarms and correctly complete the device specification sheet. Students will have access to a live FIELDVUE DVC6200 using ValveLink™ software. In conjunction with HC tiering capabilities, a basic understanding of functions and troubleshooting within ValveLink software is discussed at length. Course focus includes:
- Saving device configuration as found
- Viewing device datasets
- Comparing current datasets to historical datasets
- Restoring historical datasets
- Using status monitor
- Interpreting data from status monitor
- Performing a stroke valve test

Audience
This course is designed for those who have the job responsibility to perform detailed configurations and basic diagnostic troubleshooting of FIELDVUE digital valve controllers with HC tier.

Prerequisites
Successful completion of 1760V is required.
Fisher™ - FIELDVUE™ Digital Valve Controller - Advanced Diagnostics (AD) Tier – 1762V CEUs - .4

Overview
This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours each part. It introduces data collection methods for offline diagnostic testing and troubleshooting of the FIELDVUE digital valve controllers with Advanced Diagnostic (AD) Tier. Students will have access to a live FIELDVUE DVC6200 using ValveLink™ software, and will discuss the proper setup and execution of diagnostic functionality within the AD tier. Dynamic scan and step response tests will be conducted, and the class will interpret analyzed data and review the details of diagnostic graphs for each. Areas of focus for AD diagnostic functionality include:

- Step Response Test - stroking speed
- Step Response Test -9-point step test
- Step Response Test - performance test
- Step Response Test – 3-point ramp
- Step Response Test - supply pressure
- Step Response Test - drive signal
- Valve Signature - graph and analyzed data
- Dynamic Error Band
- Drive Signal

Topics
- Verifying specification sheet information
- Viewing/initializing AD related diagnostic information
- Identifying common features of diagnostic graphs
- Interpreting AD tier diagnostics

Audience
This course is designed for those with job responsibilities to configure and perform diagnostic tests as well as interpret diagnostic data of the FIELDVUE digital valve controller with AD tiering.

Prerequisites
Successful completion of 1760V and 1761V is required.

Fisher™ - FIELDVUE™ Digital Valve Controller – Performance Diagnostics (PD) Tier – 1763V CEUs - .4

Overview
This 4-hour remote virtual classroom course event consists of 2 virtual classroom parts, 2 hours each part. It introduces data collection methods for online diagnostic testing and troubleshooting of the FIELDVUE digital valve controllers with Performance Diagnostic (PD) Tier. Students will have access to a live FIELDVUE DVC6200 device using ValveLink™ software, and will discuss the proper setup and execution of diagnostic functionality within the PD tier. Permanent tiering step-up options are discussed, including the free one-time step up to PD tier, as well as specific procedures to follow when changing a digital valve controller’s diagnostic tier. Diagnostic functions of interest include:

- PD One Button
- Profiles
- Triggered Profiles
- Friction
- Friction Trends

Topics
- Verifying specification sheet information
- Running a PD One Button Test
- Viewing/analyzing PD related diagnostic information
- Configuring scheduler to run diagnostics
- Configuring/Activating trending and network alert scan functions
- Understanding digital valve controller diagnostic tiering levels

Audience
This course is designed for those with job responsibilities to perform and interpret online diagnostic tests associated with the FIELDVUE digital valve controller with PD tiering.

Prerequisites
Successful completion of 176V, 1761V, and 1762V is required.

Fisher™ – FOUNDATION™ fieldbus FIELDVUE™ Digital Valve Controller – 7036 CEUs – 2.1

Overview
This 3-day course reviews the role and function of control valve positioners followed by a series of hands-on exercises to disassemble, inspect, assemble, install, and commission a FOUNDATION fieldbus FIELDVUE digital valve controller. During commissioning, students will learn the basics of the FOUNDATION fieldbus protocol, the role of function blocks, addressing, modes and status. Students will configure, calibrate, and commission devices using Emerson Communicator and ValveLink™ Solo software. Hands-on exercises also teach students how to perform detailed setup routines and how to run and collect data for various ValveLink software diagnostics.

Topics
- Positioner Basics
- FOUNDATION fieldbus overview
- FIELDVUE digital valve controller installation and mounting
- Modes and status
- Configuration and calibration with the 475 or AMS Trex™ Communicator and ValveLink Mobile
- ValveLink™ software guided Setup/Detailed Setup
- Tuning
- Tag management
- Pressure control
- ValveLink software diagnostics
- FIELDVUE instrument troubleshooting

Audience
This course teaches technicians and engineers the basics of FOUNDATION fieldbus digital valve controller installation, configuration, calibration, and troubleshooting.

Prerequisites
Some experience in instrument calibration and in control valve maintenance, installation, and operation would be helpful.
### Fisher™ – Diagnostic Data Interpretation using ValveLink™ Software for FIELDVUE™ - Digital Valve Controllers – 1759 CEUs – 2.1

**Overview**
This 3-day course uses practical exercises and discussions to teach the student to interpret and analyze diagnostic data obtained using FIELDVUE digital valve controllers and ValveLink software. Students will perform diagnostic tests on a variety of valve/actuator combinations and use the data to determine bench set, dynamic error band, seat load, spring rate and other pertinent parameters. Students will also perform comparison tests on valve/actuator assemblies containing configuration or operating flaws and use the data for troubleshooting purposes.

**Topics**
- Review of ValveLink software diagnostic tests
- Data interpretation
- Troubleshooting techniques
- Comparison testing techniques
- Performance diagnostics

**Audience**
This course is for technicians, engineers and others responsible to collect and interpret valve diagnostic tests performed using ValveLink™ software.

**Prerequisites**
Students must have completed one of the following: 1751, 1752, 7036, or 1760V Series (1760V, 1761V, 1762V, 1763V).

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### Fisher™ - QUIKLOOK 3-FS Basics – 1427 – Continued...

- Enter valve, instrument, and actuator data
- Correctly enter test parameters
- Perform various step and stroking tests to collect diagnostic data
- Analyze typical and atypical, valve diagnostic data
- Create/view standard valve diagnostic system reports

**Topics**
- QUIKLOOK 3-FS valve diagnostic system hardware/software overview
- In-depth software navigation
- Setup and testing techniques
- Data entry & test criteria best practices
- Data management
- Report generation/expected results
- Background software routines and equations for the analysis numbers
- Case study analysis- including discussions of valve/instrument/installation problems
- Laboratory activities/support

**Audience**
This course is designed for personnel who will perform and interpret control valve diagnostic testing using a QUIKLOOK 3-FS valve diagnostic system.

**Prerequisites**
Knowledge and experience of valves, actuators, control valve instrumentation operation and basic maintenance. Completion of 1400 or 1400V, 1700 or 1700V, and 1450 courses is recommended but not required.

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### Fisher™ - QUIKLOOK 3-FS Basics – 1428 – Continued...

Currently, those who complete this course will:
- Select the appropriate QUIKLOOK 3-FS valve diagnostic system test for a given scenario.
- Understand the impact of scan rates on the appearance and interpretation of acquired data.
- Analyze valve diagnostic test data to determine overall control valve health by evaluating the condition of the various components of the assembly.
- Identify multiple anomalies in a single assembly.
- Use QUIKLOOK 3-FS valve diagnostic system functions to generate quick reports.
- Learn how to perform a step test on a discrete valve without interrupting power to the valve.

**Topics**
- Review of various valve diagnostic tests and specific objectives of each
- Impact of test configuration errors
- Data interpretation from tests of “bugged” valve assemblies
- Multiple anomalies found in control valves
- Exporting data
- Generating quick reports
- Interpretation of difficult to detect control valve problems

**Audience**
This course is designed for personnel who are responsible for interpreting plots and other diagnostic data that is acquired with the QUIKLOOK 3-FS valve diagnostic system. This course focuses on data interpretation. Data acquisition is taught in course 1427.

**Prerequisites**
A pre-test and a control valve awareness test are used to confirm applicant readiness. Course 1427 and a minimum of six months of diagnostic testing with the QUIKLOOK 3-FS valve diagnostic system.
Typical Technicians Learning Path

Rosemount - Process Measurement Products (Pressure & Temperature) - I – 2326
CEUs - 2.18

Overview
This 4-day course explains how pressure and temperature transmitters function and how they are installed and calibrated. It emphasizes installation, proper set-up and calibration of Analog and HART® Pressure and Temperature Transmitters. The course uses lectures and labs to teach the students. Those who complete this class will be able to:
- correctly perform installation and setup procedures
- properly configure transmitters
- properly calibrate transmitters
- perform basic troubleshooting

Topics
- Basic 4-20 mA Loop Setup
- Pressure Sensors
- Temperature Sensors (TC, RTD)
- Analog Transmitters (1151)
- HART® Communication
- Field Communicator
- Pressure Transmitters
- Temperature Transmitters
- Using AMS Device Manager to Configure and Calibrate Transmitters
- Installation
- Configuration
- Calibration
- Troubleshooting

Audience
This course is intended for technicians, engineers and other plant personnel who need to know installation, calibration, maintenance and troubleshooting of measurement instrumentation.

Prerequisites
Some experience in instrument calibration, maintenance, installation and operation would be helpful.

Rosemount - Process Measurement Products (DP Flow) - II – 2327
CEUs - 1.4

Overview
This 2-day course explains how DP flow instruments function and how they are installed and calibrated. It emphasizes installation, proper setup and calibration/verification of DP flow instruments. The course uses lectures and labs to teach the students. Those who complete this class will be able to:
- correctly install configure, calibrate multivariable DP Flow Transmitters
- perform DP Flow troubleshooting

Topics
- Basic DP Flow Fundamentals
- DP Flow Sizing Calculations
- Multivariable Flow Transmitters
- AMS Device Manager with Engineering Assistant Snap-ON (3095)
- Engineering Assistant for 3051SMV
- Field Communicator
- Test Equipment Selection
- Installation
- Configuration
- Calibration /Verification
- Troubleshooting DP Flow Installations

Audience
This course is intended for technicians, engineers and other plant personnel who need to know installation, calibration, verification, maintenance and troubleshooting of DP flow measurement instrumentation.

Prerequisites
Some experience in instrument calibration/verification, maintenance, installation and operation would be helpful.
**Rosemount - Process Measurement Products (Level) - III – 2333**

**CEUs - 2.1**

**Overview**
This 3-day course explains how level instruments function and how they are installed calibrated/verified. It emphasizes installation, proper setup and calibration/verification of level instruments. The course uses lectures and labs to teach the students. Those who complete this class will be able to:
- correctly install, configure, calibrate/verify, perform maintenance and troubleshooting on the following:
  - DP Level Transmitters
  - Guided Wave Radar Transmitters
  - Non-contacting Radar Transmitters
- Use Radar software for configuration and troubleshooting

**Topics**
- DP Level Fundamentals
- Electronic Remote Sensors
- Radar Applications
- Radar Instruments
- Radar PC Software
- Field Communicator
- Test Equipment Selection
- Installation
- Configuration
- Calibration /Verification
- Troubleshooting

**Audience**
This course is intended for technicians, engineers and other plant personnel who need to know installation, calibration, maintenance and troubleshooting of level measurement instrumentation.

**Prerequisites**
Experience in instrument calibration, maintenance, installation and operation would be helpful.

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**AMS - AMS Device Manager w/Rosemount HART® Instruments – 7021**

**CEUs - 2.1**

**Overview**
Learn the installation, calibration, maintenance, and troubleshooting of measurement instrumentation using AMS Device Manager. This 3-day course teaches maintenance and calibration of measurement devices using AMS Device Manager software to communicate and track information. The student will learn how pressure and temperature transmitters function, are installed, and calibrated using AMS Device Manager. The course uses hands-on training, labs, and lecture to teach the student how to:
- configure and use AMS Device Manager correctly perform transmitter installation and setup procedures
- properly configure HART® transmitters
- properly calibrate transmitters
- perform basic troubleshooting - transmitters

**Topics**
- Configuring and Using AMS Device Manager
- Viewing and Modifying Devices
- Creating a Plant Database Hierarchy and Adding Devices
- AMS Device Manager Browser Functions
- Audit Trail
- HART® Communication
- HART Transmitters (3051C, 3144P)
- Test Equipment Selection
- Transmitter Installation and Configuration
- Transmitter Calibration
- AMS Calibration Assistant
- Intelligent Calibrators
- Transmitter Troubleshooting

**Audience**
The hands-on focus is on skills required by engineers, technicians, or others that are new to the plant or instrument environment.
### Typical Engineering Training Path

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>CEUs</th>
<th>CEUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2326</td>
<td>Rosemount - Process Measurement Products (Pressure &amp; Temperature) - I – 2326</td>
<td>4</td>
<td>2.18</td>
</tr>
<tr>
<td>2327</td>
<td>Rosemount - Process Measurement Products (DP Flow) - II – 2327</td>
<td>2</td>
<td>1.4</td>
</tr>
</tbody>
</table>

#### Overview

**Rosemount - Process Measurement Products (Pressure & Temperature) - I – 2326 CEUs - 2.18**

**Overview**

This 4-day course explains how pressure and temperature transmitters function and how they are installed and calibrated. It emphasizes installation, proper setup and calibration of Analog and HART® Pressure and Temperature Transmitters. The course uses lectures and labs to teach the students. Those who complete this class will be able to:

- correctly perform installation and setup procedures
- properly configure transmitters
- properly calibrate transmitters
- perform basic troubleshooting

**Topics**

- Basic 4-20 mA Loop Setup
- Pressure Sensors
- Temperature Sensors (TC, RTD)
- Analog Transmitters (1151)
- HART® Communication
- Field Communicator
- Pressure Transmitters
- Temperature Transmitters
- Using AMS Device Manager to Configure and Calibrate Transmitters
- Installation
- Configuration
- Calibration
- Troubleshooting

**Audience**

This course is intended for technicians, engineers and other plant personnel who need to know installation, calibration, maintenance and troubleshooting of measurement instrumentation.

**Prerequisites**

Some experience in instrument calibration, maintenance, installation and operation would be helpful.

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**Rosemount - Process Measurement Products (DP Flow) - II – 2327 CEUs - 1.4**

**Overview**

This 2-day course explains how DP flow instruments function and how they are installed and calibrated. It emphasizes installation, proper setup and calibration/verification of DP flow instruments. The course uses lectures and labs to teach the students. Those who complete this class will be able to:

- correctly install configure, calibrate multivariable DP Flow Transmitters
- perform DP Flow troubleshooting

**Topics**

- Basic DP Flow Fundamentals
- DP Flow Sizing Calculations
- Multivariable Flow Transmitters
- AMS Device Manager with Engineering Assistant Snap-ON (3095)
- Engineering Assistant for 3051SMV
- Field Communicator
- Test Equipment Selection
- Installation
- Configuration
- Calibration /Verification
- Troubleshooting DP Flow Installations

**Audience**

This course is intended for technicians, engineers and other plant personnel who need to know installation, calibration, verification, maintenance and troubleshooting of DP flow measurement instrumentation.

**Prerequisites**

Some experience in instrument calibration/verification, maintenance, installation and operation would be helpful.
Rosemount - Process Measurement Products (Level) - III – 2333
CEUs - 2.1

Overview
This 3-day course explains how level instruments function and how they are installed calibrated/verified. It emphasizes installation, proper setup and calibration/verification of level instruments. The course uses lectures and labs to teach the students. Those who complete this class will be able to:

- correctly install, configure, calibrate/verify, perform maintenance and troubleshooting on the following:
  - DP Level Transmitters
  - Guided Wave Radar Transmitters
  - Non-contacting Radar Transmitters
- Use Radar software for configuration and troubleshooting

Topics
- DP Level Fundamentals
- Electronic Remote Sensors
- Radar Applications
- Radar Instruments
- Radar PC Software
- Field Communicator
- Test Equipment Selection
- Installation
- Configuration
- Calibration/Verification
- Troubleshooting

Audience
This course is intended for technicians, engineers and other plant personnel who need to know installation, calibration, maintenance and troubleshooting of level measurement instrumentation.

Prerequisites
Experience in instrument calibration, maintenance, installation and operation would be helpful.

AMS - AMS Device Manager with Rosemount HART® Instruments – 7021
CEUs - 2.1

Overview
Learn the installation, calibration, maintenance, and troubleshooting of measurement devices using AMS Device Manager. This 3-day course teaches maintenance and calibration of measurement devices using AMS Device Manager software to communicate and track information. The student will learn how pressure and temperature transmitters function, are installed, and calibrated using AMS Device Manager. The course uses hands-on training, labs, and lecture to teach the student how to:

- configure and use AMS Device Manager correctly perform transmitter installation and setup procedures
- properly configure HART® transmitters
- properly calibrate transmitters
- perform basic troubleshooting-transmitters

Topics
- Configuring and Using AMS Device Manager
- Viewing and Modifying Devices
- Creating a Plant Database Hierarchy and Adding Devices
- AMS Device Manager Browser Functions
- Audit Trail
- HART® Communication
- HART Transmitters (3051C, 3144P)
- Test Equipment Selection
- Transmitter Installation and Configuration
- Transmitter Calibration
- AMS Calibration Assistant
- Intelligent Calibrators
- Transmitter Troubleshooting

Audience
The hands-on focus is on skills required by engineers, technicians, or others that are new to the plant or instrument environment.

Rosemount - Fieldbus Measurement Instruments – 2370
CEUs - 2.1

Overview
This 3-day class covers the integration of FOUNDATION™ fieldbus compliant measurement devices using the Field Communicator, Emerson USB Fieldbus Modem, AMS Device Manager, and other hosts.

Upon completion of this course students will be able to: install, configure, calibrate, and troubleshoot Rosemount Fieldbus devices which include the 3051C and 3051S Pressure Transmitters, 644, 3144P and 848 Temperature transmitters 5600, 5400 and 5300 Radar Level Transmitters, and 752 Indicator.

Topics
- FOUNDATION™ fieldbus Overview
- Fieldbus: Wiring/Segment Design/Function Blocks
- Field Communicator Operation
- AMS Device Manager Operation
- Theory of Operation, Installation, Configuration, Maintenance, Calibration and Troubleshooting on the following:
  - 3051C Pressure Transmitter
  - 3051S Pressure Transmitter
  - 3144P, and 644 Temperature Transmitters
  - 848 Temperature Transmitter
  - 5600, 5400 and 5300 Radar Level Transmitters
  - 752 Fieldbus Indicator

Note: Course may be conducted using other Fieldbus Hosts, such as AMS Device Manager.

Audience
This course is for individuals responsible for installing, configuring, calibrating, and troubleshooting FOUNDATION™ fieldbus measurement devices.

Prerequisites
Experience in instrument calibration, maintenance, installation, and operation would be helpful.
Rosemount - Wireless Self Organizing Network (2 day) – 2375
CEUs - 1.4

Overview
This 2-day course explains how Self Organizing Wireless Networks function and how they are installed, setup, configured and integrated. It emphasizes planning, proper installation and startup, configuration, maintenance, and integration. The course uses lectures and labs to maximize the hands on experience and teach the students. Students who complete this course will:

- correctly install and setup the 1420 & 1410 Wireless Gateway
- properly install and configure Wireless Transmitters
- properly integrate Host interfaces to the Wireless Gateway

Topics
- How Self Organizing Networks Function
- Self Organizing Networks Best Practices
- Network Components
- 1420 & 1410 Installation and Setup
- Network Parameters
- Wireless Transmitters Installation, Configuration, Maintenance and Calibration
- THUM Installation, Wiring and Configuration
- Integrating and Operating AMS Device Manager with the 1420 Wireless Gateway
- Operation of AMS Wireless SNAP-ON
- Modbus Serial Integration
- Modbus TCP Integration
- OPC Integration

Audience
This course is intended for technicians, engineers and other plant personnel who need to know how to design, install, setup, configure, maintain and troubleshoot Wireless Self Organizing Networks and their components.

Prerequisites
Some experience in Wireless Networks and Host integration would be helpful.
Rosemount Measurement

Wireless: 2375  2376  e2977
AMS Device Manager: 7020  7021  E2300
Interactive Plant Environment: 2808  2821  2898  2829  2812  2896  2875
Flow: 2340  2340A  2341  2341A  C6000  C6001  C6002  C6003  C6004  2339SM  2339SV  2875
2383  2394  2384  2387

Rosemount Tank Gauging

RTG101  RTG102

Rosemount Analytical

Rosemount Gas Analyzer: 2110  2157  2153  2170  2171

Rosemount Gas Chromatographs

R4100  R4210  R4105  R4170  R4212  R4213  R4214  R4215  R4311  R4315  R4316  e4070

Rosemount Liquid

2200  2204  2201  2205  E2601  E2602
Rosemount - Interactive Plant Environment Pressure Transmitters – 2808 CEUs - 1.4

Overview
This 2-day course combines lectures with bench-top labs and uses the interactive plant for scenario based training. Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Pressure transmitters. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a "real world" plant environment.

Topics
- Identify Transmitter Parts and Functionality
- Explain the Principles of Operation of Pressure Transmitters
- Configure, Calibrate and Test Pressure Transmitters using the Field Communicator
- Properly Install and Troubleshoot Pressure Transmitters
- Students shall ensure proper PPE and safety measures while working on the plant.

Audience
Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Pressure transmitters.

Rosemount - Interactive Plant Environment Rosemount Pressure & Temperature Transmitters – 2898 CEUs - 2.1

Overview
This 3-day course combines lectures with bench-top labs and uses the interactive plant for scenario based training. Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Pressure and Temperature transmitters. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a "real world" plant environment.

Topics
- Explain the Difference between HART® & Analog Transmitters
- Identify Transmitter Parts and Functionality
- Explain the Principles of Operation of Pressure and Temperature Transmitters
- Configure, Calibrate and Test Pressure and Temperature Transmitters using the Field Communicator
- Properly Install and Troubleshoot Pressure and Temperature Transmitters
- Students shall ensure proper PPE and safety measures while working on the plant.

Audience
Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Pressure and Temperature transmitters.

Rosemount - Interactive Plant Environment Temperature Transmitters – 2821 CEUs - 0.7

Overview
This 1-day course combines lectures with bench-top labs and uses the interactive plant for scenario based training. Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Temperature transmitters. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a "real world" plant environment.

Topics
- Identify Transmitter Parts and Functionality
- Explain the Principles of Operation of Temperature Transmitters
- Configure, Calibrate and Test Temperature Transmitters using the Field Communicator
- Properly Install and Troubleshoot Temperature Transmitters
- Students shall ensure proper PPE and safety measures while working on the plant.

Audience
Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Temperature transmitters.

Rosemount - Interactive Plant Environment Rosemount Pressure, MultiVariable™ Flow Transmitters – 2829 CEUs - 2.8

Overview
This 4-day course combines lectures with bench-top labs and uses the interactive plant for scenario based training. Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Pressure, Temperature, and Multi-Variable Flow transmitters. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a "real world" plant environment.

Topics
- identify transmitter parts and functionality
- explain the principles of operation of the transmitters
- configure, calibrate and test transmitters using the field communicator, AMS Device Manager, and Engineering Assistant software
- configure the compensated flow parameters
- properly install and troubleshoot pressure, temperatures and multi-variable flow transmitters

Audience
Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount Pressure, Temperature, and Multi-Variable Flow transmitters.
### Rosemount Interactive Plant Environment MultiVariable™ Flow Transmitter – 2812
**CEUs - 1.1**

**Overview**
This 1-1/2 day course combines lectures with bench-top labs and uses the interactive plant for scenario based training. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a "real world" plant environment.

**Topics**
- Identify Transmitter Parts and Functionality
- Explain the Principles of Operation of the Transmitters
- Configure, Calibrate and Test Transmitters using the Field Communicator, AMS Device Manager, and Engineering Assistant Software
- Configure the Compensated Flow Parameters
- Properly Install and Troubleshoot Pressure, Temperatures and Multi-Variable Flow Transmitters
- Students shall ensure proper PPE and safety measures while working on the plant.

**Audience**
Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount 3051SMV Multi-Variable Flow transmitters.

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### Rosemount Interactive Plant Environment Level Transmitters – 2896
**CEUs - 1.4**

**Overview**
This 2-day course combines lectures with bench-top labs and uses the interactive plant for scenario based training. Students shall apply classroom knowledge directly to the interactive plant scenario labs. Be ready to learn in a "real world" plant environment.

**Topics**
- Identify Transmitter Parts and Functionality
- Explain the Principles of Operation the Transmitters
- Configure, Calibrate/Verify and Test Radar Level Transmitters using the Field Communicator, Radar Master Software
- Understand How to Setup the Radars in Different Applications
- Properly Install and Troubleshoot the 5300 & 5400 Transmitters and their Applications

Students shall ensure proper PPE and safety measures while working on the plant.

**Audience**
Target students are individuals responsible for the installation, configuration, calibration and maintenance of the Rosemount 5300 & 5400 Radar Level transmitters.

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### Rosemount Interactive Plant Environment Wireless Self Organizing Networks – 2875
**CEUs: 2.5**

**Overview**
This 3.5-day course combines classroom theory with hands-on labs. Learn by doing with the Interactive Plant Environment. This unique training setting provides a safe and realistic environment to elevate skills and knowledge through direct interaction with live wireless networks and devices. This course is designed for engineers and technicians whose responsibilities include: startup, configuration, troubleshooting, and host integration of wireless networks and devices. Be ready to learn in a "real world" plant environment.

**Topics**
- Perform a wireless network planning walkthrough
- Know and operate wireless network planning tools
- Install a wireless network following wireless best practices
- Installation and configuration of wireless devices
- Installation and configuration of THUMs
- Troubleshoot Wireless networks, performance and connectivity
- Connect and prove proper MOBUS communications
- Connect and prove proper OPC communications

**Audience**
Engineers and Instrument Technicians

**Prerequisites**
Some experience in Wireless Networks and Host Integration would be helpful, but not required. Some basic instrument knowledge would be beneficial.
<table>
<thead>
<tr>
<th>Course Name</th>
<th>CEUs</th>
<th>Overview</th>
<th>Topics</th>
<th>Audience</th>
<th>Prerequisites</th>
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</thead>
<tbody>
<tr>
<td>Rosemount - Wireless Self Organizing Network (2 day)</td>
<td>2375</td>
<td>This 2-day course explains how Self Organizing Wireless Networks function and how they are installed, setup, configured and integrated. It emphasizes planning, proper installation and startup, configuration, maintenance, and integration. The course uses lectures and labs to maximize the hands-on experience and teach the students. Students who complete this course will:</td>
<td>• How Self Organizing Networks Function • Self Organizing Networks Best Practices • Network Components • 1420 &amp; 1410 Installation and Setup • Network Parameters • Wireless Transmitters Installation, Configuration, Maintenance and Calibration • THUM Installation, Wiring and Configuration • Integrating and Operating AMS Device Manager with the 1420 Wireless Gateway • Operation of AMS Wireless SNAP-ON • Modbus Serial Integration • Modbus TCP Integration • OPC Integration</td>
<td>This course is intended for technicians, engineers, and other plant personnel who need to know how to design, install, setup, configure, maintain, and troubleshoot Wireless Self Organizing Networks and their components.</td>
<td>Some experience in Wireless Networks and Host integration would be helpful.</td>
</tr>
<tr>
<td>Rosemount - Wireless Self Organizing Network (1 day)</td>
<td>2376</td>
<td>This 1-day course explains how Self Organizing Wireless Networks function and how they are installed, setup, and configured. It emphasizes planning, proper installation and startup, configuration and maintenance. The course uses lectures and labs to maximize the hands-on experience and teach the students. Students who complete this course will:</td>
<td>• correctly install and setup the 1420 &amp; 1410 Wireless Gateway • properly install and configure Wireless Transmitters</td>
<td></td>
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</tr>
<tr>
<td>Rosemount - Wireless Pressure Gauge e2977</td>
<td>0.3</td>
<td>The Wireless Pressure Gauge on-demand course offers a comprehensive set of “How to” lessons designed to bring an interactive learning environment over the internet directly to you at any time. By the end of the course, you will know how to specify, install, configure, maintain, and troubleshoot the gauge. In addition, the course provides learning to maximize the use of the Wireless Pressure Gauge’s new capabilities.</td>
<td>• How Self Organizing Networks Function • Self Organizing Networks Best Practices • Network Components • 1420 &amp; 1410 Installation and Setup • Network Parameters • Wireless Transmitters Installation, Configuration, Maintenance and Calibration • THUM Installation, Wiring, Configuration • Integrating and Operating AMS Device Manager with the 1420 &amp; 1410 Wireless Gateway and Wireless Devices</td>
<td></td>
<td>Some experience in Wireless Networks and Host integration would be helpful. Completion of the Wireless classes on Plantweb University would be beneficial.</td>
</tr>
</tbody>
</table>
AMS - AMS Device Manager – 7020
CEUs - 2.1

Overview
Completing 3-days of AMS Device Manager hands-on instructor assisted training modules and exercises, provides the quickest route to your productive use of this predictive maintenance application.

Topics
• Viewing and Modifying Devices
• Creating a Plant Database Hierarchy and Adding Devices
• Using the Field Communicator with AMS Device Manager
• Using the AMS Device Manager Browser Functions
• Audit Trail
• Calibrating Device - Calibration Assistant
• Configuring and Monitoring System Alerts
• Installing an AMS Device Manager Server Plus Standalone
• Starting AMS Device Manager for the First Time
• Network Communication Interface Setup
• AMS Device Manager Database Management
• Installing a Distributed System
• Installing Device Types from Media
• MV Engineering Assistant SNAP-ON Application
• QuickCheck™ SNAP-ON Application
• AMS Device Manager OPC Server and the Matrikon OPC Explorer
• AMS Device Manager Web Services
• AlertTrack™ SNAP-ON Application
• Wireless SNAP-ON Application

Audience
This course is intended for technicians and engineers who need to configure and use AMS Device Manager.

AMS - AMS Device Manager w/Rosemount HART® Instruments – 7021
CEUs - 2.1

Overview
Learn the installation, calibration, maintenance, and troubleshooting of measurement instrumentation using AMS Device Manager. This 3-day course teaches maintenance and calibration of measurement devices using AMS Device Manager software to communicate and track information. The student will learn how pressure and temperature transmitters function, are installed, and calibrated using AMS Device Manager. The course uses hands-on training, labs, and lecture to teach the student how to:

• configure and use AMS Device Manager correctly perform transmitter installation and setup procedures
• properly configure HART® transmitters
• properly calibrate transmitters
• perform basic troubleshooting-transmitters

Topics
• Configuring and Using AMS Device Manager
• Viewing and Modifying Devices
• Creating a Plant Database Hierarchy and Adding Devices
• AMS Device Manager Browser Functions
• Audit Trail
• HART® Communication
• HART Transmitters (3051C, 3144P)
• Test Equipment Selection
• Transmitter Installation and Configuration
• Transmitter Calibration
• AMS Calibration Assistant
• Intelligent Calibrators
• Transmitter Troubleshooting

Audience
The hands-on focus is on skills required by engineers, technicians, or others that are new to the plant or instrument environment.

Rosemount - AMS Trex Device Communicator - e2300
CEUs – 0.1

Overview
E2300 AMS Trex Device Communicator is an introductory course with lessons on theory of operation, model number and spare part selection, communicator configuration, connecting, communicating, and/or powering HART®, FOUNDATION™ Fieldbus, and wireless devices and positioners, unit maintenance, and troubleshooting the unit and device connectivity.
Rosemount - Smart Magnetic Flowmeter
- 8700 Series – 2340
CEUs - 0.7

Overview
This 1-day course consists of a blend of lectures and hands-on exercises that cover how to install, configure, and maintain the Rosemount 8700 Series Magnetic Flowmeter Systems composed of the Model 8712 and 8732 transmitters and the 8705 Flanged and 8711 Wafer Sensors. The students will learn the operation and capabilities of Local Operator Interface (LOI), 475 Field Communicator, and/or AMS Device Manager and how to use these tools to perform configuration. Common issues encountered and troubleshooting techniques will also be covered.

Topics
- Explain the Difference and Capabilities of the Rosemount 8700 Series Magnetic Flowmeters
- Identify Transmitter and Sensor Parts and Explain Functionality
- Explain Faraday’s Law and the Principles of Operation of Magnetic Flowmeter System
- Configure and Test Transmitters Using the LOI, Field Communicator, or AMS Device Manager
- Properly Install/Troubleshoot the Rosemount Magnetic Flowmeter System

Audience
This course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Rosemount 8700 Series Magnetic flowmeter. Typical job functions include: maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
Knowledge of basic flow fundamentals and instrumentation.

Rosemount - Smart Magnetic Flowmeters with AMS Device Manager - 8700 Series – 2340A
CEUs - 0.7

Overview
This 1-day course consists of a blend of lectures and hands-on exercises that cover how to install, configure, and maintain the Rosemount 8700 Series Magnetic Flowmeter Systems composed of the Model 8712 and 8732 transmitters and the 8705 Flanged and 8711 Wafer Sensors. The students will learn the operation and capabilities of AMS Device Manager and how to use this tool to perform configuration. Common issues encountered and troubleshooting techniques will also be covered.

Topics
- Explain the Difference and Capabilities of the Rosemount 8700 Series Magnetic Flowmeters
- Identify Transmitter and Sensor Parts and Explain Functionality
- Explain Faraday’s Law and the Principles of Operation of Magnetic Flowmeter System
- Configure and Test Transmitters Using AMS Device Manager
- Properly Install/Troubleshoot the Rosemount Magnetic Flowmeter System

Audience
This course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Rosemount 8700 Series Magnetic flowmeter. Typical job functions include: maintenance technicians, instrument technicians, and instrumentation engineers.

Prerequisites
None required. However, basic understanding of the fundamentals of flow measurement, electricity, analog and frequency signal processing are assumed.

Rosemount - 8800 Series Smart Vortex Flowmeter with HC475 – 2341
CEUs - 0.7

Overview
This 1-day course consists of a blend of lectures and hands-on exercises that cover how to install, configure, and maintain the Rosemount 8800 Series Smart Vortex flowmeter systems. The students will learn the operation and capabilities of the Local Operator Interface and HC475 Field Communicator and how to use these tools to perform configuration. Common issues encountered and troubleshooting techniques will also be covered.

Topics
- Explain the Differences and Capabilities of the Rosemount 8800 Series Vortex Flowmeters
- Explain the von Karman Effect and the Principles of Operation of Vortex Flowmeters
- Identify Vortex Parts and Explain Functionality
- Configure and Test Transmitters using Field Communicator or AMS Device Manager
- Properly Install and Troubleshoot the Rosemount 8800 Series Vortex Flowmeter System

Audience
This course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Rosemount 8800 Series Vortex Flowmeter. Typical job functions include: maintenance technicians, instrument technicians, and instrument engineers.

Prerequisites
None required. However, basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing are assumed.
Rosemount - 8800 Series Smart Vortex Flowmeters with AMS Device Manager - 2341A
CEUs - 0.7

Overview
This 1-day course consists of a blend of lectures and hands-on exercises that cover how to install, configure, and maintain the Rosemount 8800 Series Vortex flowmeter systems. The students will learn how to use AMS Device Manager to perform configuration. Common issues encountered and troubleshooting techniques will also be covered.

Topics
- Explain the Differences and Capabilities of the Rosemount 8800 Series Vortex Flowmeters
- Explain the von Karman Effect and Principles of Operation of Vortex Flowmeters
- Identify Vortex Parts and Explain Functionality
- Configure and Test Transmitters using the AMS Device Manager
- Properly Install and Troubleshoot the Rosemount 8800 Series Vortex Flowmeter System

Audience
This course is intended for anyone that is involved with properly installing, wiring, configuring and troubleshooting a Rosemount 8800 Series Vortex Flowmeter. Typical job functions include; maintenance technicians, instrument technicians, and instrument engineers.

Prerequisites
None required. However, basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing are assumed.

Rosemount - Vortex Online Instrument & Electrical (I&E) Technician Training - c6000

Overview
This curriculum group contains c6001, c6002, c6003 and c6004. This entire curriculum may be purchased at a discounted price, or each section of the curriculum may be purchased individually. Unlimited access for 3 months. Duration: 3 Hours.

Topics
- theory
- product offering and model selection
- vortex sizing
- installation best practices for piping, mounting, remote electronics and wiring
- device configuration for the 475 HART® Field Communicator and the AMS Device Manager
- using the configuration tools
- electronics, sensor and process troubleshooting
- vibration, mass balancing, and filter troubleshooting.

Rosemount - Vortex Theory & Specification - c6001

Overview
This curriculum is part of the Vortex Online Instrument and Electrical (I81E) Technician Training. It may be purchased individually or with the c6000 curriculum. Unlimited access for 3 months. Duration: .5 hour

Topics
- key parameters for a basic vortex configuration
- how to use AMS and the Field Communicator to configure an 8800D Vortex meter
- advanced configuration for special units of measure, base volume units - density ratio, pulse output, totalizer, display variables and saturated steam using the MTA option

Rosemount - Vortex Installation Best Practices - c6002

Overview
This curriculum is part of the Vortex Online Instrument and Electrical (I81E) Technician Training. It may be purchased individually or with the c6000 curriculum. Unlimited access for 3 months. Duration: .5HR

Topics
- piping requirements
- mounting
- remote electronics
- wiring

Rosemount – Vortex Device Configuration & Using Configuration Tools - c6003

Overview
This curriculum is part of the Vortex Online Instrument and Electrical (I81E) Technician Training. It may be purchased individually or with the c6000 curriculum. Unlimited access for 3 months. Duration: 1 HR

Topics
- troubleshooting scenarios
- electronics, sensor and process troubleshooting
- vibration, mass balancing and filtering troubleshooting.
Overview
This 1/2-day field class is a condensed version of the 2340 course briefly reviewing the theory of operation, meter components and installation. The focus of the class is to provide a hands-on experience configuring and troubleshooting of the 8700 Magnetic metering system composed of the Model 8712 and 8732 Transmitters and the 8705 Flanged and 8711 Wafer Sensors. The students will learn the operation and capabilities of the Local Operator interface & HC475 and how to use these tools to perform configuration. Common issues encountered and troubleshooting techniques will also be covered.

Topics
- Magnetic Flowmeter System
- Smart vs. Analog Transmitters
- Flow Tube Selection
- Configuring Using LOI and AMS Device Manager
- Local Operator Interface Functions
- Positive Zero Return
- Auxiliary Functions and Special Units
- Signal Conditioning
- System Troubleshooting and Maintenance
- Bench Testing/Digital Trims
- Process Noise and Grounding Diagnostics
- Meter Verification Diagnostics

Audience
This course is intended as a refresher course for anyone that is involved with properly configuring and troubleshooting a Rosemount 8700 Series Smart Magnetic Flowmeter. Typical job functions include; maintenance technicians, instrument technicians and instrumentation engineers. This class is also intended to be taught as two, 1/2-day repeat sessions to accommodate customers who need to train their entire department but must also maintain the operation of their plant by scheduling their employees between an AM/PM sessions.

Prerequisites
Some prior experience working with Rosemount Magnetic Flowmeters is recommended. However, students with no past experience can also benefit. For all attendees, it is assumed they have a basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing.

Topics
- Explain the Differences and Capabilities of the Rosemount 8800 Series Vortex Flowmeters
- Explain the von Karman Effect and Principles of Operation of Vortex Flowmeters
- Identify Vortex Parts and Explain Functionality
- Configure and Test Transmitters using the AMS Device Manager
- Properly Install and Troubleshoot the Rosemount 8800 Series Vortex Flowmeter System

Audience
This class is intended as a refresher course for anyone that is involved with properly configuring and troubleshooting a Rosemount 8800 Series Smart Vortex Flowmeter. Typical job functions include; maintenance technicians, instrument technicians and instrumentation engineers. This class is also intended to be taught as two, 1/2 day repeat sessions to accommodate customers who need to train their entire department but must also maintain the operation of their plant by scheduling their employees between an AM/PM sessions.

Prerequisites
Some prior experience working with Micro Motion Vortex Flowmeters is recommended. However, students with no past experience can also benefit if their learning objectives are to get a basic introduction to operation, installation, configuration and troubleshooting. For all attendees, it is assumed they have a basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing.

Topics
- Explain the Fundamentals for how a Micro Motion Coriolis, Rosemount 8700 Series Magnetic & 8800 Series Vortex Flowmeters Work with a 1420 Wireless Gateway and 775 Smart THUM Adapter
- Install and Wire a 775 Smart THUM to Micro Motion and Rosemount Transmitters
- Connect to and Configure the Micro Motion and Rosemount Transmitters to work with a 1420 Wireless Gateway
- Configure a 775 Smart THUM and the Transmitters to Communicate on the Gateway using AMS Device Manager

Audience
This course is intended for anyone that is involved with installing, wiring, configuring and troubleshooting a Micro Motion Coriolis, Rosemount 8700 Magnetic & 8800 Vortex Flowmeters with a 775 Wireless THUM. Typical job functions include; maintenance technicians, instrument technicians and instrumentation engineers.

Prerequisites
General understanding of the HART® protocol and operation and configuration of a Micro Motion Coriolis, Rosemount 8700 Magnetic and 8800 Vortex meters is assumed.
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Course Code</th>
<th>CEUs</th>
<th>Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosemount - Magnetic 8700 Series &amp; Vortex Flowmeters 8800 Series</td>
<td>2394</td>
<td>0.7</td>
<td>This 1-day course is an abbreviated version of the 2340 and 2341 courses for Rosemount 8700 Series Magnetic and 8800 Series Vortex meters. Typically, 2/3 of the course time is spent on Rosemount's 8800 Vortex flowmeter and 1/3 on Rosemount's 8700 Magnetic Flowmeter. Theory of operation, meter components and installation of each flowmeter are covered. The focus of the class is to provide a hands-on experience configuring and reviewing the most common troubleshooting issue and best practices for resolution.</td>
</tr>
<tr>
<td>Micro Motion - Coriolis &amp; Rosemount 8700 Magnetic Flowmeters</td>
<td>2384</td>
<td>0.7</td>
<td>This 1-day field class provides hands-on training on both the Coriolis and Magnetic Flowmeters. Typically, 2/3 of the course time is spent on Micro Motion's Coriolis meter and 1/3 on Rosemount's 8700 Magnetic Flowmeter. Theory of operation, meter components and installation of each flowmeter are covered. The focus of the class is to provide a hands-on experience configuring and troubleshooting best practices. Students will learn the Micro Motion Series 1000/2000 transmitters using one of these configuration tools: Prolink III, HC475, AMS Device Manager or Series 3000 display interface devices. Public field classes typically use Prolink III for configuring the Micro Motion transmitters and the HC475 will be used for the Rosemount 8700 Magnetic flowmeter. Customers can choose which configuration device is used for classes held at their site.</td>
</tr>
<tr>
<td>Micro Motion - Coriolis &amp; Rosemount 8800 Vortex Flowmeters</td>
<td>2387</td>
<td>0.7</td>
<td>This 1-day field class provides hands-on training on both Coriolis and Vortex Flowmeters. Typically, 2/3 of the course time is spent on Micro Motion's Coriolis meter and 1/3 on Rosemount's 8800 Vortex Flowmeter. Theory of operation, meter components and installation of each flowmeter are covered. The focus of the class is to provide a hands-on experience configuring and troubleshooting best practices. Students will learn the Micro Motion Series 1000/2000 transmitters using one of these configuration tools: Prolink III, HC475, AMS Device Manager or Series 3000 display interface devices. Public field classes typically use Prolink III for configuring the Micro Motion transmitters and the HC475 will be used for the Rosemount 8800 Vortex flowmeter. Customers can choose which configuration device is used for classes held at their site.</td>
</tr>
</tbody>
</table>

**Topics**
- After attending the course the student will be able to do the following for both the Rosemount Magnetic Magnetic and Vortex flowmeters:
- Briefly Explain the Fundamentals for How Each Flowmeter Works and the Function of the Key Components
- Have a Basic Understanding of the Installation Best Practices for Orienting, Mounting and Wiring the Sensor and Transmitter
- Perform a Basic Configuration of the Metering System for Various Applications
- Diagnose and Know How to Correct the Most Common Meter and Process Issues

**Audience**
This combined class is intended anyone that is involved with properly configuring and troubleshooting a Rosemount 8700 Smart Magnetic & 8800 Smart Vortex Flowmeters. Typical job functions include; maintenance technicians, instrument technicians and instrumentation engineers.

**Prerequisites**
This being a 1-Day class covering two flowmeters, some prior experience working with Rosemount's Magnetic and Vortex flowmeters is recommended. However, students with no past experience can also benefit if their learning objectives are to get a basic introduction to operation, installation, configuration and troubleshooting. For all attendees, it is assumed they have a basic understanding of the fundamentals of flow measurement, electricity, analog & frequency signal processing.

**Topics**
- After attending the course, the student will be able to do the following for both Micro Motion's Coriolis and Rosemount 8700 Magnetic flowmeters:
  - Briefly Explain the Fundamentals for How Each Flowmeter Works and the Function of the Key Components
  - Basic Understanding of the Installation Best Practices for Orienting, Mounting and Wiring the Sensor and Transmitter
  - Perform a Basic Configuration of the Metering System for Various Applications
  - Diagnose and Know How to Correct the Most Common Meter and Process Issues

**Audience**
This combined class is intended anyone that is involved with properly configuring and troubleshooting a Micro Motion flow and density meter and Rosemount 8700 Smart Magnetic Flowmeters. Typical job functions include; maintenance technicians, instrument technicians and instrumentation engineers.

**Prerequisites**
Some prior experience working with Micro Motion Coriolis & Rosemount 8700 Magnetic flowmeters is recommended. However, students with no past experience can also benefit. A basic understanding of the fundamentals of flow measurement.

**Topics**
- Students will be able to do the following for both Micro Motion's Coriolis and Rosemount 8800 Vortex flowmeters:
  - Briefly Explain the Fundamentals for How Each Flowmeter Works and the Function of the Key Components
  - Have a Basic Understanding of the Installation Best Practices for Orienting, Mounting and Wiring the Sensor and Transmitter
  - Perform a Basic Configuration of the Metering System for Various Applications
  - Diagnose and Know how to Correct the Most Common Meter and Process Issues
  - Configure the Metering System to Measure Available Process Variables from the Device for Their Application
  - Learn a Step by Step Process to Perform Basic Troubleshooting of the Most Common Meter and Process Issues

**Audience**
This combined class is intended anyone that is involved with properly configuring and troubleshooting a Micro Motion flow and density meter and Rosemount 8800 Micro Motion - Coriolis & Rosemount 8800 Vortex Flowmeters – 2387

**Prerequisites**
Some prior experience with Micro Motion Coriolis & Rosemount 8800 Vortex flowmeters. A basic understanding of the fundamentals of flow measurement, electricity, analog and frequency signal processing.
Rosemount - Tank Gauging Technical Product Training - RTG101
CEUs - 3.5

Overview
This 5-day Tank Gauging Technical Product Training focuses on the 5900S system, our Wireless Tank Gauging System, a little about Rex and Pro, as well as other field equipment relevant for the Rosemount Tank Gauging system. The training covers installation, configuration and troubleshooting of our products, as well as general TankMaster functions. Students who complete this course will:
- correctly perform installation and setup procedures
- properly configure Tank Gauging System
- plan a Wireless installation
- perform basic troubleshooting

Topics
- System Overview
- Perform basic troubleshooting
- 2410 TankHub
- 5900 Gauges
- Rosemount 2240S
- Rosemount 2230 Display
- 5300/5400 Gauges
- Field Communication
- Electrical and Mechanical Installation
- System Configuration
- LPG/LNG
- Wireless
- AMS Wireless Snap-On
- Gateway
- Emulation
- SIL
- Troubleshooting

Audience
This course is customized for service, project, and sales engineers. The course includes both practical and theoretical training

Prerequisites
This course is suitable for service, project, and sales engineers, and is a good start for new employees and customers.

Rosemount - TankMaster Training - RTG102
CEUs – 2.5

Overview
This 4-day TankMaster Training covers more detailed information about TankMaster functions. Students who complete this course will be able to:
- Perform System Configuration
- Configure Host Communication
- Properly use Redundancy
- Use Batch Handling
- Program Basic Custom Views
- Perform Basic Troubleshooting

Topics
- System Overview
- Volume Calculations
- WinOpi Tools Menu
- Host Communication and OPC
- TankMaster Batch
- Custom Views and Translation
- Network Basics
- TankMaster to Enraf
- Redundancy
- Administrator Program Backup & Restore
- TankMaster Hybrid & HTG
- Troubleshooting

Audience
This course is suitable for anyone who works with TankMaster, including customers who is using WinOpi as the operator interface. The course includes both practical and theoretical training.

Prerequisites
It is required that you previously attended the RTG101 Technical Product Training course or have very good knowledge of the Rosemount Tank Gauging System.
Rosemount – Analytical – Gas Analysis

LEARNING PATHS

Rosemount – MLT Process Gas Analyzer – 2110

Overview
This 3-day course is a classroom training where students learn principles and practical operation of MLT analyzers. Through hands-on training, the student will learn on how to install, maintain, and troubleshoot the MLT analyzer. Using MLT Analyzer demo units students will:

- Understand the Photometric measurement principles such as the theory of Infrared and Ultraviolet Spectrometry, Paramagnetic and Thermal Conductivity
- Learn the signal processing of the electronic boards.
- Learn the test procedure for troubleshooting and diagnostics

Topics
- Introduction to the function of Physical parts
- Function of Electronic boards
- Test points and procedure
- Mechanical Assembly / Disassembly
- Programming of software parameters
- Calibration setup manual (Auto calibration when available)
- Analog outputs, and Digital Inputs / Outputs
- Save / Load configuration functionality
- Spare parts

Prerequisites
Basic Knowledge of PGA Analysers would be helpful

Rosemount – X-Stream Gas Analyzer for Continuous Emissions Monitoring Systems (CEMS) – 2157

Overview
This 3-day course covers basic fundamentals and the theory of operation, installation, calibration and maintenance of Continuous Emissions Monitoring Systems (CEMS).

Topics
- Environmental Requirement
- Process Applications
- Theory of Operation
- Sample System Instrument
  - Installation and Troubleshooting
  - Hardware and Maintenance

Audience
This course is for instrument technicians responsible for the maintenance of continuous emissions monitoring systems.

Rosemount - X-Stream Process Gas Analyzers (PGA) – 2170

Overview
This 3-day course is a classroom training where students learn principles and practical operation of X2 analyzers. Through hands-on training, the student will learn on how to install, maintain, and troubleshoot the X2 analyzer. Using X2 Analyzer demo units students will:

- Understand the Photometric measurement principles such as the theory of Infrared and Ultraviolet Spectrometry, Paramagnetic and Thermal Conductivity
- Learn the signal processing of the electronic boards.
- Learn the test procedure for troubleshooting and diagnostics

Topics
- Introduction to the function of Physical parts
- Function of Electronic boards
- Test points and procedure
- Mechanical Assembly / Disassembly
- Programming of software parameters
- Calibration setup manual (Auto calibration when available)
- Analog outputs, and Digital Inputs / Outputs and Modbus setup
- Save / Load configuration functionality
- Spare parts

Prerequisites
Basic Knowledge of PGA Analysers would be helpful

Rosemount - X-Stream Gas Analyzer for Continuous Emissions Monitoring Systems (CEMS) – 2157

Overview
This 3-day course covers basic fundamentals and the theory of operation, installation, calibration and maintenance of Continuous Emissions Monitoring Systems (CEMS).

Topics
- Environmental Requirement
- Process Applications
- Theory of Operation
- Sample System Instrument
  - Installation and Troubleshooting
  - Hardware and Maintenance

Audience
This course is for instrument technicians responsible for the maintenance of continuous emissions monitoring systems.

Topics
- Introduction to the function of Physical parts
- Function of Electronic boards
- Test points and procedure
- Mechanical Assembly / Disassembly
- Programming of software parameters
- Calibration setup manual (Auto calibration when available)
- Analog outputs, and Digital Inputs / Outputs and Modbus setup
- Save / Load configuration functionality
- Spare parts

Prerequisites
Basic Knowledge of PGA Analysers would be helpful

Rosemount - Oxygen Flue Gas Analyzer, 6888A Analyzer – 2153

CEUs – 0.7

Overview
This 1-day course covers combustion measurement principles and the theory of operation of oxygen analyzers. The class will discuss the installation, operation, calibration and maintenance of the Rosemount 6888A Oxygen Analyzer.

Topics
- Combustion Requirements
- Methods of Oxygen Analysis
- Typical Uses of Oxygen Analysis
- Combustion Efficiency
- Zirconia (ZrO2) Oxygen Analysis
- Theory of Operation
- Oxygen Analyzer
  - Installation
  - Hardware
  - Maintenance
  - Troubleshooting
- Hart Communications

Prerequisites
Basic Knowledge of PGA Analysers would be helpful

Rosemount - Oxygen Flue Gas Analyzer, 6888A Analyzer – 2153

CEUs – 0.7

Overview
This 1-day course covers combustion measurement principles and the theory of operation of oxygen analyzers. The class will discuss the installation, operation, calibration and maintenance of the Rosemount 6888A Oxygen Analyzer.

Topics
- Combustion Requirements
- Methods of Oxygen Analysis
- Typical Uses of Oxygen Analysis
- Combustion Efficiency
- Zirconia (ZrO2) Oxygen Analysis
- Theory of Operation
- Oxygen Analyzer
  - Installation
  - Hardware
  - Maintenance
  - Troubleshooting
- Hart Communications

Prerequisites
Basic Knowledge of PGA Analysers would be helpful
### Rosemount - Gas Analysis: Safety Training for On-Line Process Gas Analyzers – 2171

**Overview**
This fully customized 5-day course provides students with a strong understanding of gas analyzer best practices as they relate to the safe operation and maintenance of the specific models of Rosemount Analytical Gas Analyzers found in their plants, including the NGA2000, MLT, Binos, CLD, X-STREAM, and X-STREAM XE. The instructor focuses on the specific analyzers that are applicable to the students’ specific needs. This course emphasizes safe handling of Rosemount Analytical analyzers. All necessary equipment and important handouts will be provided.

**Topics**
- Analyzer Overview, Including Hardware and Construction
- Software Functionality
- Physical Principals of IR and UV Photometric Measurements and Oxygen Paramagnetic Measurements
- Overview of the Electronics
- Replacement of Physical Components
- Testing and Troubleshooting
- Spare Parts
- Mechanical Assembly/Disassembly
- Sample Handling System – Method, Theory, and Troubleshooting
- Site-specific Applications
- Theory of Operation
- Installation and Start Up
- Troubleshooting and Maintenance
- Audit and Reporting Requirements

---

### Rosemount - Gas Chromatographs (GC) - Introduction - 500 & 700 - R4100
**Overview**
This 3-day course gives students a basic understanding of how the Rosemount Analytical 500 and 700 gas chromatographs (formerly Danalyzer GCs) work, emphasizing chromatograph fundamentals and basic theory.

**Topics**
- Reviewing Basic Chromatography Principles
- Understanding Chemistry, Flow Configuration, and Gas Systems
- Understanding Basic Sample Systems
- Working with Chromatograph Hardware
- Setting Timed Events, Retention Times, and Response Factors
- Understanding Data Calculations
- Identifying Problems Using Chromatograms

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### Rosemount - Gas Chromatographs - Introduction, Model 700XA & 1500XA - R4105
**Overview**
This 3-day course gives students basic understanding of how Rosemount Analytical gas chromatographs 700XA & 1500XA (formerly Danalyzer GCs) work, emphasizing chromatograph fundamentals and basic theory.

**Topics**
- Reviewing Chromatography Principles
- Understanding Chemistry, Flow Configuration, and Gas Systems
- Reviewing Sample Systems
- Working with Chromatograph Hardware
- Setting Timed Events, Retention Times, and Response Factors
- Understanding Data Calculations
- Reading Chromatograms
- Calibrating a Gas Chromatograph

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### Rosemount - Operation & Maintenance - Gas Chromatographs of Model 500 - R4210
**Overview**
This 5-day course is appropriate for those who have either worked with a Gas Chromatograph for at least six months or completed the Introductory Gas Chromatograph course. It prepares participants to operate and repair a Model 500 Gas Chromatograph.

**Topics**
- Understanding Gas Chromatography and a Gas Chromatograph
- Using the Basic Chromatograph System in Process Gas Analysis
- Understanding Carrier and Calibration Gas Systems
- Installing and Operating MON Software
- Applying Chromatograph Integration Techniques and Post-Analysis Calculations
- Using the Chromatograph to Identify Problems
- Setting Timed Events, Retention Times, and Response Factors
- Starting Up a Gas Chromatograph
- Understanding Sample Handling Systems
- Verifying Proper Operation of a Gas Chromatograph
- Troubleshooting the 2350A Controller
- Configuring the 2350A Controller User Directory Outputs
- Conducting Preventative Maintenance
- Communicating to Other Devices
- Reviewing Spare Parts Recommendations

**Prerequisites**
Students that have at least 6 months experience with Emerson GC’s, just purchased an Emerson GC or are seeking a refresher course after having worked on their Emerson GC benefit most from this course. Candidates from non-technical backgrounds should consider taking R4100 Introduction to GC’s (for Model 500, 700 or 1000)

Classes typically start at 1pm CST on Monday and end at 12pm CST on Friday to accommodate travel.
**Rosemount – 370XA Gas Chromatograph – Introduction – E4070**

**Overview**
Online introduction to Rosemount’s 370XA Gas Chromatograph.

**Topics**
- Reviewing 370XA features
- Installation
- Calibration
- Introducing the Maintainable Module™
- Reading Chromatograms

**Rosemount - Analytical 370XA Gas Chromatograph - Operation & Maintenance - R4170**

CEUs – 2.1

**Overview**
This 3-day training is a level 1 course and includes theory, operations and maintenance practices for the Rosemount Analytical 370XA Gas Chromatograph (formerly Danalyzer GC). Module overview hardware and software overview as well as basic troubleshooting skills.

**Topics**
- Chromatographic Theory
- Detector Theory
- Understanding Chromatograms
- Startup Procedures
- Natural Gas Sample Handling
- Using 370XA Software Assistants
- Cal-Saver™
- Running Auto Valve Timing
- Module Initializations
- Calibrations, Validation & Routine Maintenance (Valve Rebuilding)
- Troubleshooting the module
- 370XA Hardware
- MON2020 Software

**Prerequisite**
E4070 Introduction to the Model 370XA.

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**Rosemount - Operation & Maintenance - Model 700 - Gas Chromatograph - R4212**

CEUs – 2.8

**Overview**
This 5-day course is appropriate for those who have either worked with a chromatograph for at least six months or completed the Introductory Gas Chromatograph course. It prepares participants to operate and repair a Rosemount Analytical 700 Gas Chromatograph. It prepares participants to operate and repair a Model 700 gas chromatograph.

**Topics**
- Understanding Gas Chromatography and Gas Chromatographs
- Using the Basic Chromatograph System in Process Gas Analysis
- Understanding Carrier and Calibration Gas Systems
- Installing and Operating MON Software
- Applying Chromatograph Integration Techniques and Post-Analysis Calculations
- Using the Chromatograph to Identify Problems
- Setting Timed Events, Retention Times, and Response Factors
- Starting a Gas Chromatograph
- Understanding Sample Handling Systems
- Verifying Proper Operation of the Gas Chromatograph
- Conducting Preventative Maintenance
- Communicating to Other Devices

**Prerequisites**
Students that have at least 6 months experience with Emerson GC’s, just purchased an Emerson GC or are seeking a refresher course after having worked on their Emerson GC benefit most from this course. Candidates from non-technical backgrounds should consider taking R4100 Introduction to GC’s (for Model 500, 700 or 1000) Classes typically start at 1pm CST on Monday and end at 12pm CST on Friday to accommodate travel

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**Rosemount - Analytical 700XA & 1500XA Gas Chromatograph - Operation & Maintenance - R4213/R4214**

CEUs – 2.8

**Overview**
This 5-day course is appropriate for those who have either worked with a GC for at least six months or completed the introductory gas chromatograph course. It prepares participants to operate and repair a Rosemount Analytical 700XA & 1500XA Gas Chromatograph.

**Topics**
- Understanding Gas Chromatography and Gas Chromatographs
- Using the Basic Chromatograph System in Process Gas Analysis
- Understanding Carrier and Calibration Gas Systems
- Installing and Operating MON Software
- Applying Chromatograph Integration Techniques and Post-Analysis Calculations
- Using the Chromatograph to Identify Problems
- Setting Timed Events, Retention Times, and Response Factors
- Starting a Gas Chromatograph
- Understanding Sample Handling Systems
- Verifying Proper Operation of the Gas Chromatograph
- Conducting Preventative Maintenance
- Communicating to Other Devices
- Reviewing Spare Parts Recommendations

**Audience**
This course is best suited for students working in a technical environment.

**Prerequisites**
Students that have at least 6 months experience with Emerson GC’s, just purchased an Emerson GC or are seeking a refresher course after having worked on their Emerson GC benefit most from this course. Candidates from non-technical backgrounds should consider taking R4105 Introduction to GC’s (for 700XA/1500XA).
Rosemount - Gas Chromatographs (GC) - Operation & Maintenance of the Flame Photometric Module - R4215 CEUs – 2.8

Overview
The 5-day course covers the theoretical and practical aspects of the flame Photometric Module [FPD] used with the model 500, 700 and 700XA. It does not cover any aspect of the theory of the model 500, 700 or 700XA neither does it cover the menus and use of MON2000/ MON2020. The course concentrates on practical work. The course is aimed at those who will be carrying out maintenance on the FPD module.

Topics
- Sulphur
- FPD Theory and Maintenance
- Applications
- Dismantling and Rebuilding a Flame Cell Replacing all the “O” Rings
- Removing/Installing the Flame Cell and Photomultiplier into the FPD Module
- Setting Up the Hydrogen/Air Ratio to Achieve Continuous Combustion
- Adjusting the Entry of the sample into the Flame Cell
- Setting Up the Flame Out Circuit
- Adjusting the Amplifier to Optimize Peak Amplitude
- FPD Chromatograms
- Routine Maintenance
- Fault Finding

Prerequisites
Students attending this course must have completed either of these Operations & Maintenance courses: R4210, R4212, or R4213/R4214.

Rosemount - Gas Chromatographs (GC) Process - Advanced - 500 & 700 - R4311 CEUs – 2.8

Overview
This 5-day course is most valuable to those with three years of chromatography experience, or those who have completed the introductory “Operation and Maintenance of Gas Chromatographs’ course. Participants will develop an advanced understanding of gas chromatograph operation, troubleshooting, and maintenance. Training becomes customized when students present application information. Given that data, the experienced instructor will look closely at specific applications and offer participants insight.

Topics
- Understanding Chromatograph Flow Configurations
- Overhauling Valves
- Reviewing Thermal Conductivity, Flame Ionization, and Flame Photometric Detectors
- Understanding Sample/Carrier/Calibration Gas Systems
- Working with and troubleshooting the Rosemount Analytical 2350A Controller
- Installing and Using MON Software for Integration and Calibration
- Setting Timed Events, Retention Times, and Response Factor Calculations
- Understanding Startup Procedures
- Setting Valve Timing and Flows with Different Flow Configurations
- Checking for Proper Separation and Analyzing Gas Chromatographs
- Verifying Proper Operation of the Gas Chromatograph
- Troubleshooting the Chromatograph and 2350A Controller
- Configuring Reporting Details and Control Outputs
- Conducting Preventative Maintenance
- Communicating to Other Devices
- Reviewing Spare Parts
- Recommendations

Prerequisites
Students attending this course must have completed either of these Operations & Maintenance courses: R4210, R4212, or have 3 years of advanced chromatography experience.

Rosemount - Analytical 700XA & 1500XA Gas Chromatographs (GC) - Advanced Process - R4315/R4316 CEUs - 3.5

Overview
This 5-day course equips students with a full understanding of many advanced techniques used in process gas chromatography. An experienced instructor and focused material enable students to troubleshoot a variety of field issues for the Rosemount Analytical 700XA & 1500XAGC.

Topics
- Setting Valve Timing
- Hardware Troubleshooting
- Mixture Adjustments for FID
- Mixture Adjustment for FPD
- Verifying proper operation of the Gas Chromatograph
- Overview of Model 1500XA
- Liquid Sample Injection
- Review of Sample System Techniques
- Calibration and Accuracy Checks
- Recovery of GC After Analysis Interruption
- GC Start-up After Overhaul
- Communicating to Other Devices
- Understanding flow settings for various flow configurations
- Understanding when to overhaul valves

Prerequisites
Students attending this course must have completed either of Operations & Maintenance course R4213/R4214 or have 3 years of advanced chromatography experience.
Overview
This 1-day course provides a solid theoretical background in pH, Conductivity, and ORP measurements. Students who complete this course will be able to:
- Understand how each measurement is made
- Recognize installation/application problems
- Configure and calibrate instruments
- Implement a maintenance program
- Troubleshoot problems using diagnostics

Topics
- What is pH/Conductivity/ORP
- How pH/Conductivity/ORP Measurements are Made
- Physical Process Properties and How They Effect On-Line Measurements
- Proper Calibration Techniques
- Cleaning and Maintenance of a Sensor
- Choosing Correct Sensor for Any Process
- How to Decipher Diagnostics Readouts
- pH/Conductivity Sensor Overview
- pH/Conductivity/ORP Analyzer Overview

Overview
This 1-day course provides insight into the complicated amperometric measurements of chlorine, dissolved oxygen and ozone. Students will learn the concepts of how amperometric sensors work and how to calibrate each type of measurement. Students who complete this course will be able to:
- Understand the theory behind how amperometric sensors work and how to calibrate each type of measurement
- Differentiate the various species of chlorine
- Implement a proper maintenance program
- Use diagnostics to troubleshoot problems

Topics
- Amperometric Measurement Theory:
  - Chlorine/Dissolved Oxygen/Ozone
  - Calibration Procedures for Each Measurement
  - Maintenance & Troubleshooting Tips

Overview
This 1-day course is fully customized to cover the specific measurements that the customer requests. A certified trainer will cover up to 4 subjects in one day. The 4 subjects may be measurement or product related. The list of measurements that can be bundled into a tailored made training course are pH, ORP, contacting conductivity, toroidal conductivity, turbidity, chlorine, dissolved oxygen, and ozone. Each measurement theory has its own duration which can be modified to fit the customers’ time frame needs. Select an analyzer (course 2204) or transmitter (course 2202) to accompany the measurement theories for a well-rounded class.

Topics
- Installation and Application Problems
- Configuration of Outputs / Alarms (If Applicable)
- Programming of Automated Cleaning Systems (DO, pH)
- Use Diagnostic Features (If Applicable)
- Sensor Calibration
- Troubleshooting
Maximize Your Investment!

I&E Measurement Instrument Technician Curriculum Path

Self-Guided Primers
- E2300

Core Competencies
- 2326 Measurement Products I
- 2327 Measurement Products II
- 2333 Measurement Products III

Additional Competencies
- 7021 AMS Device Manager with Rosemount HART

I&E Technician Job Competencies
- Install, Configure, and Test Measurement Instruments
- Maintain & Troubleshoot Measurement Instruments
- Connect to HART Devices
- Calibrate & Commission devices and instrumentation

Your maintenance technicians instrument knowledge and skills can affect your plants performance, up-time and maintenance costs and ultimately your bottom line.

Emerson Educational services can boost your personnel skills, performance and reinforce job competencies.

Emerson I&E Technician Curriculum Path provides focused, in-depth skills based training for proper installation, configuration, testing, calibrating, maintaining and troubleshooting your Measurement Instruments.

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Or more training options see us at:
www.emerson.com/education
Maximize Your Investment!

I&E Measurement Instrumentation Engineer Curriculum Path

Self-Guided Primers
- E2300

Core Competencies
- 2326 Measurement Products I
- 2327 Measurement Products II
- 2333 Measurement Products III
- 2370 Fieldbus Instruments
- 2375 Wireless Plant Network
- 7021 AMS Device Manager with Rosemount HART

I&E Engineer Job Competencies
- Install, Configure, and Test Measurement Instruments
- Maintain &Troubleshoot Measurement Instruments
- Connect to HART, Wireless and Field Fieldbus Devices
- Calibrate &Commission devices and instrumentation
- Calibration Management
- Instrument Reliability
- Instrument Selection

Your maintenance engineer instrument knowledge and skills can affect your plants performance, up-time and maintenance costs and ultimately your bottom line.

Emerson Educational services can boost your personnel skills, performance and reinforce job competencies.

Emerson I&E Engineer Curriculum Path provides focused, in-depth skills based training for proper installation, configuration, testing, calibrating, maintaining and troubleshooting your Measurement Instruments.

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Or more training options see us at:
www.emerson.com/education
Educational Services
Maximize Your Investment with Well-Trained Personnel

Maximize Your Investment!

Control System Engineer Curriculum Path

Self-Guided Primers
- e9025, Control Loop Foundation

Core Competencies
- 7009, DeltaV Implementation I
- 7016, DeltaV Batch Implementation

Additional Competencies
- 7076, DeltaV PMO Configuration Standard
- 7201, DeltaV Advanced
- 7202, DeltaV Model Predictive Control
- 7017, DeltaV Implementations II
- 7025, DeltaV Advanced Graphics
- 7018, DeltaV Hardware & Troubleshooting
- 7037, Communication Interfaces with the DeltaV System
- 7027, DeltaV Systems Administration Window 7/Server 2008
- 7305, DeltaV SIS Implementation
- 7020, AMS Device manager or 7039, AMS Device Manager with DeltaV
- 7032, FieldBus System and Devices

Job Competencies
- Support DeltaV Automation Control
- System performance
- Maintain, troubleshoot, and enhance configuration, application and operation of Basic Process Control System and Safety Instrumented System (SIS)
- Identify, plan, and implement process control improvement projects
- Productivity of Operations Personnel
- Alarm Rationalization and Management
- Construct and support external communication links
- Overall Risk Management of DeltaV
- Automation Control System

Your control system engineers’ process and technical knowledge and skills can directly impact your facility’s bottom line. Emerson Educational Services can dramatically boost your personnel skills and performance and reinforce job competencies.

Emerson Process Control System Engineers’ Curriculum Path provides focused, in-depth, objective-based training on product-specific procedures for proper configuration and maintenance of your DeltaV distributed control system. Your control systems engineers’ get practical application skills through dedicated classroom facilities and hardware.

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Continuous Control Operators Curriculum Path

Self-Guided Primers

▪ e9025, Control Loop Foundation
▪ e7012, DeltaV Operator Interface for Continuous Control

Core Competencies

▪ 7012, DeltaV Operator Interface for Continuous Control
▪ DeltaV Essential Operator Training Solution

Additional Competencies

▪ 7009, DeltaV Implementation I

Job Competencies

▪ Ensure Safe and Effective Operation
▪ Communicate production status
▪ Work turnaround projects
▪ Management of Change process of standard operating procedures
▪ Recognize and effective respond to unusual process issues
▪ Troubleshoot difficult production issues
▪ Suggest Production improvements
▪ Alarm Management
▪ Tune loops

Your operators’ process knowledge and skill levels affect how your process is run, which can directly impact your facility’s bottom line.

Emerson Education Services can dramatically boost your personnel skills and performance and reinforce job competencies.

Emerson Operator Curriculum Path provides focused, in-depth, objective-based training on product-specific procedures for proper operation and maintenance of your DeltaV distributed control system. Your operators get practical application skills through dedicated classroom facilities and hardware. Train your operator for peak performance and process profitability.

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Maximize Your Investment!

I&E Maintenance Technical Curriculum Path

Self-Guided Primers
- e9025, Control Loop Foundation
- e7020, AM Suite: Intelligent Device Manager Primer

Core Competencies
- 7018, DeltaV Hardware & Troubleshooting
- 7020, AMS Device Manager or 7039, AMS Device Manager with DeltaV

Additional Competencies
- 7009, DeltaV Implementation I
- 7016 DeltaV Batch Implementation
- 7030 Fieldbus Devices
- 5590, Power Quality and Grounding
- 7303/4, DeltaV SIS Maintenance
- 7037, Communication Bus Interfaces with DeltaV Systems

Job Competencies
- Maintain, trouble shoot, and make configuration changes to Basic Process Control System and Safety Instrumented Systems (SIS)
- Connect to HART® & Fieldbus devices
- Calibrate and commission devices, instruments and valves
- Proactively monitor devices for alerts, troubleshoot device problems & faulty assets

Effectiveness of Maintenance Reliability Program

Your maintenance technicians’ process knowledge and skills can affect your facility’s performance, up-time, and maintenance cost and ultimately your bottom line.

Emerson Educational Services can dramatically boost your personnel skills and performance and reinforce job competencies.

Emerson I&E maintenance Technician Curriculum Path provides focused, in depth, objective-based training on product-specific procedures for proper maintenance of your DeltaV distributed control system. Your maintenance technicians get practical applications skills through dedicated classroom facilities and hardware.

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Batch Operators Curriculum Path

Self-Guided Primers
- e9025, Control Loop Foundation
- e7014, DeltaV Operator Interface for Batch

Core Competencies
- 7014, DeltaV Operator Interface for Batch
- DeltaV Essential Operator Training Solution

Additional Competencies
- 7009, DeltaV Implementation I
- 7016 DeltaV Batch Implementation

Job Competencies
- Safely operate batches from start to finish
- Monitor batch for actionable information to keep batch within specification
- Perform manual batch tasks
- Update, review and report operator log book
- Manage sample collection with LIMS
- Provide production status during shift, anomalies, equipment, etc.

Your batch operators' process knowledge and skills levels affect how your process is run, which can directly impact your facility's bottom line.

Emerson Educational Services can dramatically boost your personnel skills and performance and reinforce job competencies.

Emerson Batch Operator Curriculum Path provides focused, in depth, objective-based training on product-specific procedures for proper operation and maintenance of your DeltaV distributed control system. Your batch operators get practical application skills through dedicated classroom facilities and hardware.

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P – Primer | C – Core Competency | A – Additional Competency

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# Plant Maintenance & IT Learning Paths

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<th>Reliability Data Collector</th>
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<th>Lubrication Specialist</th>
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P – Primer | C – Core Competency | A – Additional Competency

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# Flow Metering

## Plant Maintenance Learning Paths

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0 = Course Duration in days | X = Core Competency | O = Optional Additional Competency

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## Flow Metering

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**Fundamentals of Instrumentation and Flow Measurement**

**Flow Measurement Systems Related Courses**

**Product Courses for End Users and EPC’s**

**Application Courses**

**Product Courses for Service and Maintenance Providers**

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0 – Course Duration in days | X – Core Competency | O – Optional Additional Competency
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