



Daniel Training has brought acclaimed gas and liquid fiscal flow measurement products, services and systems to the oil and gas industry. Around the world, the Daniel name is synonymous with quality, reliability and commitment to serving its customers.

**Introduction to Natural Gas Orifice Measurement**  
Course D4120

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

**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

**Price \$1,800**

**Location Start Date 2012**

Available upon Request

**Advanced Natural Gas Orifice Flow Measurement**  
Course D4320

**Overview**

This 3-day course covers application of metering to natural gas. The course is designed for experienced gas measurement personnel with basic fundamental knowledge of meters and their operation. 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

**Price \$1,800**

**Location Start Date 2012**

Available upon Request

## **Introduction to Model 500 and 700 Gas Chromatographs**

Course D4100

### **Overview**

This 3-day course provides students with a basic understanding of how a gas chromatograph works, emphasizing chromatograph fundamentals and basic theory. The only prerequisites are basic computer skills. DMS provides an experienced on-site instructor as well as all necessary equipment and handouts for the course.

### **Topics**

- Basic Chromatography Principles and Their Application to Gas Measurement
- Basic Chemistry, Flow Configuration and Carrier and Calibration Gas Systems
- Basic Sample Systems
- Basic Chromatograph Hardware
- Timed Events, Retention Times, Response Factors
- Data Calculations and Control Parameters
- Using Chromatograms to Identify Problems
- Identifying Gas Components
- Calibrating a Gas Chromatograph
- Operation of MON Software

**Price** \$1,500

**Location**      **Start Date 2012**  
Houston, TX      1/18, 2/22, 5/9, 5/30, 7/11,  
8/8, 10/10

Note: Courses typically start at 8 AM on Wednesday and end at 12 PM on Friday to accommodate travel.

## **Operation and Maintenance of the Model 500 Gas Chromatographs**

Course D4210

### **Overview**

This 5-day course prepares students to operate and/or repair model 500 gas chromatograph. As a prerequisite, a student should either have worked with a chromatograph for at least six months or attended the DMS Introduction to Gas Chromatographs Class. Students receive four days of hands-on instruction and all necessary equipment and training materials.

### **Topics**

- What a Gas Chromatograph is and How it Operates
- Using the Basic Chromatograph System in Natural Gas Analysis
- Carrier and Calibration Gas Systems
- Chromatograph Hardware
- Installation and Operation of MON Software
- Chromatogram Integration and Post-Analysis Calculations
- Using the Chromatogram to Identify Problems
- Setting Timed Events, Retention Times and Response Factors
- Start-Up Procedures
- Sample Handling System
- Verifying that the Chromatograph is Operating Properly
- Troubleshooting the 2350A Controller and the Chromatograph
- Configuring the 2350A Controller User Directory Outputs
- Preventative Maintenance Service Procedures
- Communication of Gas Data to Other Devices, such as a Flow Computer or DCS
- Spare Parts and Necessary Service Tools

**Price** \$2,400

**Location**      **Start Date 2012**  
Houston, TX      2/27, 4/16, 5/21, 7/16, 9/10,  
11/12

Note: Courses typically start at 1 PM on Monday and end at 12 PM on Friday to accommodate travel.

## **Operation and Maintenance of the Model 700 Gas Chromatographs**

Course D4212

### **Overview**

This 5-day course prepares students to operate and/or repair a gas chromatograph. As a prerequisite, a student should either have worked with a chromatograph for at least six months or attended the DMS Introduction to Gas Chromatographs Class. Students receive four days of hands-on instruction and all necessary equipment and training materials.

### **Topics**

- What a Gas Chromatograph is and How it Operates
- Using the basic Chromatograph System in Natural Gas Analysis
- Carrier and Calibration Gas Systems
- Chromatograph Hardware
- Installation and Operation of MON Software
- Chromatogram Integration and Post-Analysis Calculations
- Using the Chromatogram to Identify Problems
- Setting Timed Events, Retention Times and Response Factors
- Start-Up Procedures
- Sample Handling System
- Verifying that the Chromatograph is Operating Properly
- Preventative Maintenance Service Procedures
- Communication of Gas Data to Other Devices, such as a Flow Computer or DCS
- Spare Parts and Necessary Service Tools

**Price** \$2,400

### **Location**

Houston, TX

### **Start Date 2012**

1/23, 3/19, 5/14, 6/4, 8/13,  
10/15

Note: Courses typically start at 1 PM on Monday and end at 12 PM on Friday to accommodate travel.

## **Advanced Model 500 Gas Chromatograph**

Course D4310

### **Overview**

This 5-day course provides students with an advanced understanding of gas chromatograph operation, troubleshooting, and maintenance. Computer operation skills are a prerequisite, along with either three years of chromatography experience or completion of the DMS Operation & Maintenance of Gas Chromatographs Course. We supply all necessary handouts for the course. Our highly experienced instructor can provide additional insight into your specific applications when you provide your chromatograph sales order number and application information.

### **Topics**

- Process Chromatograph Flow Configurations
- Overhauling Valves
- Thermal Conductivity, Flame Ionization and Flame Photometric Detectors
- Sample, Carrier and Calibration Gas Systems
- 2350A Controller Hardware
- Installing and Using MON Software for Integration and Calculations
- Setting Timed Events, Retention Times and Response Factor Calculations
- Start Up Procedures
- Setting Valve Timing and Flows with Different Flow Configurations
- Checking for Proper Separation and Analyzing Chromatograms
- Verifying that the Chromatograph is Operating Properly
- Troubleshooting the Chromatograph and 2350A Controller
- Configuring Reporting Details and Control Outputs
- Preventative Maintenance Service Procedures
- Communications and Modbus Registers
- Spare Parts and Tools

**Price** \$3,000

### **Location**

Houston, TX

### **Start Date 2012**

3/5, 4/23, 7/23, 9/17, 12/10

Note: Courses typically start at 1 PM on Monday and end at 12 PM on Friday to accommodate travel.

## **Model 700 Advanced Gas Chromatograph**

Course D4330

### **Overview**

This 5-day course is most valuable to those with three years of chromatography experience, or those who have completed the introductory Daniel Operation and Maintenance of Gas Chromatographs course. Participants will develop an advanced understanding of gas chromatograph operation, troubleshooting and maintenance. Training even becomes "customized" when students present a chromatograph sales order number and application information. Given that data, the experienced Daniel instructor will look closely at specific applications and offer participants even more insight.

### **Prerequisites**

D4210 Operation and Maintenance of Gas Chromatographs. Students should also be proficient in personal computer operations and have a basic knowledge of flow measurement.

### **Topics**

- Chromatograph Flow Configurations
- Valve Overhaul
- Thermal Conductivity, Flame Ionization and Flame Photometric Detectors
- Sample, Carrier and Calibration Gas Systems
- Model 700 Hardware
- Installing and Using MON Software for Integration and Calibration
- Setting Timed Events, Retention Times and Response Factor Calculations
- Start-Up Procedures
- Setting Valve Timing and Flows with Different Flow Configurations
- Checking for Proper Separation and Analyzing Gas Chromatographs
- Verifying that the Chromatograph is Operating Properly
- Troubleshooting the Model 700 GC
- Configuring Reporting Details/Control Outputs
- Preventive Maintenance Service Procedures
- Communications and Modbus Registers
- Spare Parts and Tools

**Price** \$3,000

**Location**      **Start Date 2012**

Houston, TX      1/30, 3/26, 6/11, 10/22

Note: Courses typically start at 1 PM on Monday and end at 12 PM on Friday to accommodate travel.

## **700XA Gas Chromatograph**

Course D4313 **NEW**

### **Overview**

This 5-day course is appropriate for those who have either worked with a chromatograph for at least six months or completed the 'Introduction to Gas Chromatographs' course. It prepares to operate and repair the new Danalyzer 700XA gas chromatograph for natural gas applications and will focus on the improvements in analyzer design and the new MON 2020 diagnostics and configuration software.

### **Topics**

- Hands-on Learning That Explains the Chromatograph, How it Operates, and What it Does to Analyze Natural Gas
- 700XA Chromatograph Hardware
- Installation and Operation of MON2020 Software
- Dual Detector Applications (C9+) and the Hydrocarbon Dew Point Calculation
- Identifying Problems, Setting Timed Events, Preparing Samples, and Implementing Preventive Maintenance Procedures
- Troubleshooting
- Spare Parts and Service Tools

**Price** \$2,400

**Location**      **Start Date 2012**  
Houston, TX      2/6, 6/18, 8/20, 11/5

Note: Courses typically start at 1 PM on Monday and end at 12 PM on Friday to accommodate travel.

**Operation and Maintenance of Gas/Liquid Ultrasonic Meters**

Course D4230/D4280

**Overview**

This 5-day course prepares students to install, operate, and maintain Daniel multipath ultra-sonic gas flow meters. In addition to four days of instruction by one of our experienced instructors, each student receives a 12-section training manual.

**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

**Price** \$2,400

**Location**

Houston, TX

**Start Date 2012**

2/13, 3/12, 4/9, 6/25, 7/30,  
8/27, 9/24, 10/29, 12/3

Note: Courses typically start at 1 PM on Monday and end at 12 PM on Friday to accommodate travel

**Introduction to Daniel Sr. Orifice Fitting**

Course D4420

**Overview**

This 1-day course is for the beginner or experienced technicians. The students will learn the operation and how to repair and troubleshoot the Model 2000.

**Prerequisites**

Basic knowledge for flow measurement.

**Topics**

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

**Price** \$600

**Location**

Houston, TX

**Start Date 2012**

Available Upon Request

## **Operation and Maintenance of Daniel S600 Flow Computers**

Course D4260

### **Overview**

This 2-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.

### **Prerequisites**

Basic knowledge of flow measurement.

### **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

**Price** \$1,800

**Location**

Houston, TX

**Start Date 2012**

Available Upon Request

## **Operation and Maintenance of the Daniel Compact Prover™**

Course D4270

### **Overview**

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

### **Prerequisites**

Basic knowledge of flow measurement.

### **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, Safety Barriers, Detector Switches, Interface Board, Hydraulic and Nitrogen System, and Spare Parts
- Overview of Calibration: Seal Leak Test, Upstream and Downstream Calibration, and Waterdraw Data Sheet
- Overview of Prover Electronics: Programming, Input and Data Modes Using Software/Local Display, Circuit Module Description, and Diagnostics

**Price** \$1,800

**Location**

Houston, TX

**Start Date 2012**

Available Upon Request

## **Operation and Maintenance to Control Valves and Turbines**

Course 4290

### **Overview**

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

### **Prerequisites**

Basic knowledge of flow measurement.

### **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

**Price** \$1,800

### **Location**

Houston, TX

### **Start Date 2012**

Available Upon Request

## **Advanced Process GC (Model 700 and 500)**

Course D4311

### **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.

### **Prerequisites**

D4210 Operation and Maintenance of Gas Chromatographs

### **Topics**

- Setting Valve Timing
- Hardware Troubleshooting
- Mixture Adjustments for FID/FPD
- Proper Setting Timed Events
- Model 700 and 500
- Overview of Model 1000A
- Liquid Sample Injection
- Review of Sample System Techniques
- Calibration and Accuracy Checks
- Recovery of GC after Analysis Interruption
- GC Startup after Overhaul

**Price** \$3,000

### **Location**

Houston, TX

### **Start Date 2012**

Available Upon Request

Contact Rosemount

713-827-6310

Note: Courses typically start at 1 PM on Monday and end at 12 PM on Friday to accommodate travel.