

***Daniel Measurement And Control, Inc., Field Services Division***

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Product training is designed to teach the user how to properly operate and maintain Daniel electronic flow measurement products such as chromatographs, ultrasonic meters and DanLoad 6000 equipment. Most of these courses are designed for the field technicians who work with the equipment, and include large amounts of hands-on training. Engineers can also benefit from these courses by gaining knowledge that will assist in properly selecting equipment for specific applications. Courses upon request can be designed to include several products or flow computers or model 2500 programming. We also have available courses such as "Introduction To Natural Gas Orifice Flow Measurement (3 days) and Advanced Natural Gas Orifice Flow Measurement. Programming courses for engineers and other technical personnel provide the expertise to most effectively utilize microprocessor based flow computing and data transmission instruments manufactured by Daniel.

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Daniel Training courses provide an introduction to measurement basics, hands-on programming and the diagnosis of potential on-site problems. Our instructors, who have years of field experience, provide practical measurement examples during lectures, as well as offer solutions to existing problems.

Participants in Training Courses work in groups and are furnished with operating models for hands-on operation. The instructor will demonstrate both fundamental concepts and troubleshooting techniques, using the actual instruments.

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**WHO SHOULD ATTEND?**

Daniel Product Training Courses are recommended for engineers and technicians who will install, operate and maintain the equipment.

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**LOCATION:**

Product Training Courses are held at Daniel Measurement and Control's

facility, 11100 Brittmoore Park Drive  
- Houston, Texas 77041

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The facility is located off Beltway 8. From Beltway 8 take the Clay road exit. At Clay road turn west and at Brittmoore (first light) turn right and proceed to Brittmoore Park Drive (approx ¼ mile) then turn left and the facility is located on the right about middle of the block.

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**TUITION:**

Tuition fees are listed on the current course schedule. The tuition fee includes all course material and supplies. Special tuition fees are available for group courses, at the Daniel plant or at customer sites.

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**COURSES:**

- Introduction To Natural Gas Orifice Flow Metering (3 Days)
- Advanced Natural Gas Orifice Flow Metering (3 Days)
- Introduction To Gas Analyzers (2 1/2 Days, Wed - Friday)
- Operation & Maintenance of Gas Analyzers (5 Days, 1/2 day Mon & Fri)

- Advanced Analyzer Training  
(5 Days, 1/2 day on Mon & Fri)
  - DanLoad 6000 Preset Operator & Maintenance (2 ½ Days)
  - Ultrasonic Flow Metering Operator & Maintenance  
(5 Days, 1/2 day on Mon & Fri)
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**REGISTRATION:**

Registration must be made in advance, no later than five (5) working days prior to the scheduled course.

To register for Product Training Courses, contact Daniel Measurement Services, Jackie Hamilton, Registrar at (713) 827-6314. All correspondence regarding these courses should be mailed to the registrar's attention at 11100 Brittmoore Park Drive, Houston, TX 77041.

Confirmation of the seminar date will be sent to you prior to the start of the seminar. Since, space is limited at each session, early registration is recommended.

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**CANCELLATIONS AND REFUNDS:**

Confirmed reservations may be cancelled up to 5 days prior to the course date. Later cancellations are subject to a service charge. Refunds will not be granted after classes have begun. Substitutions may be made at any time without penalty. If insufficient enrollment necessitates canceling a course, all tuitions will be refunded and registered participants notified four (4) working days in advance of the scheduled course.

**HOTEL ACCOMODATIONS:**

Lodging is available for participants at hotels near the program site. Room, meals and other expenses are the responsibility of the attendee. Room reservations can be made through the registrar. Some hotels located near Daniel give a special rate for class attendants, please contact the Registrar.

LaQuinta Inn & Suites  
4424 Westway Park Blvd  
(713) 939-1400  
5-10 minutes from class  
(Ask for Emerson/Daniel Preferred rate)

Crowne Plaza, Houston West  
Katy Frwy/Hwy 6  
14703 Park Row  
(281) 558-5580  
30-45 minutes from class  
\*ASK for Emerson, Daniel rate – (full restaurant & bar)

Comfort Suites  
(Extended stay)  
11440 Clay Road  
(832)467-1200

**See additional attachment**

## **INTRODUCTION TO NATURAL GAS ORIFICE FLOW MEASUREMENT**

Length: 3 Days

Class Hours: 8:30 AM – 4:30 PM

Course Abstract

The three-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.

Contents

- ▶ 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
  - Others
  
- ▶ Secondary System Details
  - Mechanical
  - Electronic
  
- ▶ Accuracy
  - Source of Inaccuracy
  
- ▶ System
  
- ▶ Summary
  - Accuracy
  - Economics

## **AVANCED NATURAL GAS ORIFICE FLOW MEASUREMENT**

Length: 3 Days

Class Hours: 8:30 AM – 4:30 PM

Course Abstract

The three-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.

Contents

- ▶ New Metering Concepts
    - Computers as Analysis
    - New Devices
    - Ultrasonics
    - Vortex Shedding
    - Coriolis
  - ▶ Future
    - Energy Forecasts
    - U.S. Gas Industry
    - World Gas Industry
  - ▶ Summary
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- ▶ 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

# I INTRODUCTION TO GAS ANALYZERS

Length: 2 1/2 Days

▶ Identifying gas components

Class Hours: 8:30 AM – 4:30 PM

▶ Calibrating a gas Analyzer

Course Abstract

▶ Operation of MON Software

This course provides students with a basic understanding of how a gas analyzer works, emphasizing analyzer 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.

## Contents

- ▶ Basic chromatography principles and their application to gas measurement
- ▶ Basic chemistry, flow configuration, and carrier and calibration gas systems
- ▶ Basic sample systems
- ▶ Basic analyzer hardware
- ▶ Timed Events, Retention Times, Response Factors
- ▶ Data calculations and control parameters
- ▶ Using chromatograms to identify problems

## **OPERATION AND MAINTENANCE OF GAS ANALYZERS**

Length: 4 Days

Class Hours:

Monday 1:00 pm to 4:30 pm

Tue-Thur 8:30 am to 4:30 pm

Friday 8:30 - NOON

### Course Abstract

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

### Contents

- ▶ What a gas analyzer is and how it operates
- ▶ Using the basic analyzer system in natural gas analysis
- ▶ Carrier and Calibration gas systems
- ▶ Analyzer 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 preparation system
- ▶ Verifying that the analyzer is operating properly
- ▶ Troubleshooting the 2350A controller and the analyzer
- ▶ Configuring of 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

## ADVANCED GAS ANALYZER

Length: 4 Days

Class Hours:

Monday 1:00 pm to 4:30 pm

Tue – Thur 8:30 am to 4:30 pm

Friday 8:30 am to NOON

### Course Abstract

This course provides students with an advanced understanding of gas analyzer operation, troubleshooting, and maintenance. Computer operation skills are a prerequisite, along with either three years of process chromatography experience or completion of the DMS Operation & Maintenance of Gas Analyzers 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 analyzer sales order number and application information.

### Contents

- ▶ 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 analyzer is operating properly
- ▶ Troubleshooting the analyzer and 2350A controller
- ▶ Configuring reporting details and control outputs
- ▶ Preventive maintenance service procedures
- ▶ Communications and Modbus registers
- ▶ Spare parts and tools

## **DANLOAD 6000**

Length: 2 ½ Day

Class Hours: 8:30 AM – 4:30 PM

Course Abstract

This course provides students with a thorough understanding of how to operate and diagnose the DanLoad 6000 preset system electronic bulk loading batch controller. We provide an experienced instructor and all necessary course material.

Contents

- ▶ Troubleshooting and repairing the 1815 control valve and LR turbine meter
  - ▶ Electronics Troubleshooting
  - ▶ Blending methods and flow sequencing
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- ▶ Components of the entire system controlled by the DanLoad 6000 electronic preset
  - ▶ Setup parameters
  - ▶ Operation of primary and secondary alarms
  - ▶ Operation of Daniel loading rack (LR) turbine meters and 1815 digital flow control valves
  - ▶ Meter proving with DanLoad 6000
  - ▶ Hardware diagnostics and troubleshooting
  - ▶ Configuring the dynamic real-time display of flow parameters
  - ▶ Configuring the DanLoad 6000 for additive injection, temperature compensation, and data communications and logging

## **ULTRASONIC FLOW METER**

Length: 4 Days

Class Hours: 8:30 AM – 4:30 PM

### **Course Abstract**

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

### **Contents**

- ▶ 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

## **Operation and Maintenance of DL8000**

Course D 4410

### **Overview**

This 3 day course equips students with a full understanding of this preset-system, electronic, bulk-loading batch controller. An experienced instructor and focused material enable students to operate and diagnose the DL8000.

### **Prerequisites**

Basic knowledge for flow measurement.

### **Topics**

- System Components  
Controlled by the DL8000
- Setup Parameters
- Primary and Secondary Alarm Operations
- Operation of Daniel Loading Rack, Turbine Meters and Digital Flow Control Valves
- Meter Proving
- Hardware Diagnostics and Troubleshooting
- Configuring Dynamic, Real-Time Display of Flow Parameters
- Configuring for Additive Injection and Temperature Compensation and Data communications/Logging
- Troubleshooting and Repairing the Control Valve and Turbine Meter
- Electronics Troubleshooting
- Blending Methods and Flow Sequencing

### **Price/Location/Start Date:**

Call to Discuss

**Introduction to M2000 Sr. Orifice  
Fitting  
Course D4420**

**Overview**

This one 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 of flow measurement.

**Topics**

- Theory of operation
- "C" Style vs. Model 2000
- Maintenance
- Operating instructions
- Installation
- Hands on learning
- Troubleshooting
- New features of M2000

**Price/Location/Start Date:**

Call to Discuss

Off-Site Training Classes Available  
Upon request.

Electronic Product Training

Contact: Ron Bauer

713.827.6330 or

[ron.bauer@emerson.com](mailto:ron.bauer@emerson.com)

Mechanical Product Training

Contact: David Smith

713.827.6320 or

[d.smith@emerson.com](mailto:d.smith@emerson.com)