SENSIA
Rockwell Automation + SLB

Measurement Services

Metering Systems and Product Training Courses

INTELLIGENT ACTION

Booking Training Courses:

To make a course reservation, discuss options for training course start dates, or for further details, please contact:

Sensia Global (UK)

Email: **mea.support@sensiaglobal.com**

Sensia, ***the*** name synonymous with high quality, reliable, and accurate flow measurement systems and products in the oil & gas industry, also provides unparalleled service support with a commitment to serving our customers.

Metering principles

Hydrocarbon fiscal metering practices and processes

Course S3000

Overview

This **2-day** course provides students with a comprehensive knowledge of every aspect of the fiscal metering process. The instructor will discuss the constraints and requirements for design of a metering station, specific applications, selection of the primary flow meter, meter proving methods, and the importance of a well designed product quality sampling system for gas and liquid fluids. Each attendee will be supplied with 200+ pages of metering documentation, which will be an invaluable reference for future metering system activities.

Prerequisites

A background in process control or plant instrumentation is preferred.

Topics

+ Introductions
+ Hydrocarbons
+ Measurement
+ Differential pressure flow meters
+ Turbine and PD flow meters proving
+ Coriolis flow meters
+ Ultrasonic flow meters
+ Wet gas and multiphase flow meters
+ Secondary instrumentation
+ Calculations and computations
+ Uncertainty
+ Allocation

Flow measurement standards and calculations

Hydrocarbon flow metering

Course S3010

Overview

This **2-day** course provides students with a good understanding of the most common metering calculations for both liquid and gas measurement applications. Calculations include ISO 5167, AGA 8, ISO 6976, API MPMS 11.2, and many more. The course provides an overview of each calculation, examines them in detail, explores the methodology, and shows the input and output routines necessary for dynamic calculations within the metering flow computer. Oil and Gas Authority (OGA) requirements will also form part of the discussion.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Foundation to fiscal metering calculations
+ Common metering calculations for liquid flow measurement
+ Common metering calculations for gas flow measurement
+ AGA8 for compressibility factor of natural gases
+ ISO6976 for calorific values, density, relative density and Wobbe Index from composition
+ API MPMS 11.2 for compressibility factors for hydrocarbons
+ ISO 5167 for measurement of fluid flow by means of pressure differential devices
+ Customer specific standards?
+ Oil and Gas Authority (OGA) requirements

Measurement uncertainty

Statistical concepts, data processing, and calculations

Course S3020

Overview

This **1-day** CPD accredited course is designed for engineers, technicians, and operators. It will also be of value to those dealing with measurement data handling, such as hydrocarbon accountants. The course explains the statistical concepts used when expressing uncertainty and guides delegates through the process of evaluating and combining sources of uncertainty to construct detailed calculations compliant with the ISO Guide. Our extensive experience over a wide range of measurement systems allows us to tailor the agenda to include examples relevant to the delegates' metering systems.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to uncertainty
+ Uncertainty calculations explained
+ Uncertainty for oil & gas measurement
+ Implementation of uncertainty calculations
+ Uncertainty in allocation

Fiscal metering system design

Industry requirements and metering product selection

Course S3030

Overview

This **2-day** course provides students with an introduction to high accuracy fluid flow measurement systems. The instructor will explain the range and operation of most gas and liquid flow measurement products and explain their suitability for fluid measurement applications. The course will explore secondary metering instrumentation, including fluid quality liquid sampling, and natural gas analyzer systems. The metering control system panel architecture will be reviewed, and the system flow computer features and functions, and metering supervisory capabilities will be explored. System device maintenance planning and good metering practices are included in the course agenda.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to fiscal flow measurement systems
+ Custody transfer, fiscal and allocation metering
+ Commercial agreements and legal requirements
+ Flow measurement methods
+ Flow meter technologies
+ Qualitative measurement
+ Flow and energy calculations
+ System maintenance
+ Good metering practices

Metering communications

Introductory course

Course S3040

Overview

This **3-day** course is designed for students with little or no experience in data communications. It provides a detailed insight into the different communications protocols, how to select and test the correct protocol, and how compatible they are when connecting hardware within the architecture of the metering system data control network. The course instructor will support the theoretical instruction with practical exercises to enhance the topics addressed.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to communications
+ RS232 communications
+ RS485 communications
+ RS422 communications
+ HART communications
+ Networking
+ Connecting to flow computers

MEASUREMENT SERVICES

Metering communications

Intermediate course

Course S3041

Overview

This **2-day** course is designed for students with previous experience in data communications. This course will build on existing knowledge and will reinforce current skills to provide a comprehensive working knowledge of key communications protocols. How to select and test the correct protocol, and how compatible they are when connecting hardware within the architecture of the metering system data control network will form an integral part of this course. The course instructor will support the theoretical instruction with practical exercises to enhance the topics addressed.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to communications
+ RS232 communications
+ RS485 communications
+ RS422 communications
+ HART communications
+ Networking
+ Connecting to flow computers

Flow computers

Operation and maintenance

Course S3050

Overview

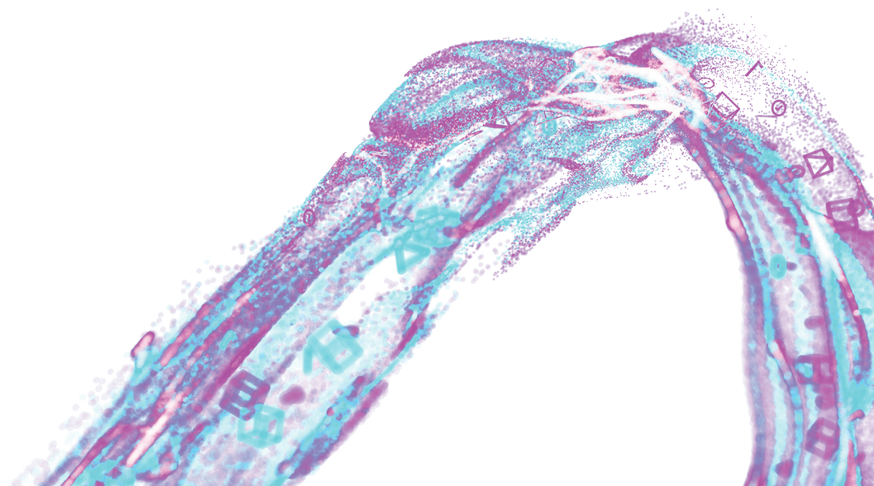
This **2-day** course provides students with a detailed appreciation of the operation, design specification, and configuration of the metering system flow computer. Fiscal standard Flow Computers such as the Omni, ABB Spirit, and the FloBoss S600+ will be used to familiarize the user with the menu structure specific to a particular application. Computer configuration, operating mode functionality, report and alarm handling, and remote access will be supplemented with maintenance aspects such as file transfer, board replacement/restore, and system network configuration protocols. The instructor will make use of the latest device configuration software to demonstrate the flow computer capabilities.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to flow computers
+ Board layout and removal
+ Communications interface
+ Keypad access and security
+ Menu navigation
+ Data/mode changing
+ Web server access
+ Alarm configuration
+ Report configuration
+ Application specific functions
+ Modbus communications calculations
+ Cold/warm starting modes
+ File back-up and download
+ Using the configuration software



TruST metering supervisory

Operation and control

Course S3060

Overview

This **1-day** course is designed for process operations personnel. It will provide trainees with a detailed understanding of metering system control and data handling from the market leading TruST Metering Supervisory Control System. The instructor will explain the metering system architecture, interface with stream and prover flow computers, the unique system graphic interface screens, system operating modes, data displays, period reports, alarm handling, system administration, and special features such as batch loading, meter proving, and sampling operations.
User application specific training can be quoted for on request.

Prerequisites

A background in process operations or flow measurement is preferred.

Topics

+ Introduction to the Trust metering system architecture
+ Supervisory operator interface graphics and controls
+ Administration and security
+ Communications interface
+ Plant control functions
+ System status conditions
+ Reporting system
+ Alarm handling

TruST metering supervisory

Operation and maintenance

Course S3061

Overview

This **2-day** course is designed for metering technicians and engineers. It will provide trainees with a detailed understanding of metering system control and data handling from the market leading TruST Metering Supervisory Control System. The instructor will explain the metering system architecture, interface with stream and prover flow computers, the unique system graphic interface screens, system operating modes, data displays, period reports, alarm handling, system administration, and special features such as batch loading, meter proving, and sampling operations. Key system maintenance activities, fault finding, recommended operating practices, and failure recovery will form part of this course.
User application specific training can be quoted for on request.

Prerequisites

A background in flow measurement or database technology is preferred.

Topics

+ Introduction to the TruST
+ Metering system architecture
+ Supervisory operator interface graphics and controls
+ Administration and security
+ Communications interface
+ Plant control functions
+ System status conditions
+ Reporting system
+ Alarm handling
+ Diagnostics
+ Optional features
+ System troubleshooting

MEASUREMENT SERVICES

Hydrocarbon gas custody transfer metering systems

System design & operation

Course S4000

Overview

This **2-day** course provides students with a detailed understanding of the principles of fluid measurement for Hydrocarbon Gases. Consideration of the correct Primary measuring device, its installation, operation, and instrumentation requirements, will be explained in detail. The instructor will reference applicable standards used for design and to optimize system performance. This includes system calibrations, device maintenance, and application of good metering system operating practices.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to gas flow measurement
+ Commercial and legal requirements
+ Principles of current gas flow measurement techniques
+ Secondary instrumentation requirements
+ Gas quality analyzer systems
+ System design standards used
+ Metering operations
+ Meter calibration
+ Calibration procedures
+ Maintenance procedures
+ Reporting and record keeping

Gas quality analyzer systems

Design and operation

Course S4010

Overview

This **1-day** course provides students with a detailed understanding of the constituents of Natural Gas, and its behavior under different operating conditions. Analytical measurement techniques, the basics of how they operate, and typical installations will be explained with reference to current industry requirements, and commercial operating procedures. Good installation practices, device calibration, system maintenance, and fault finding will be included in this course.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to gas quality measurement systems
+ Why analyze natural gas?
+ What properties of natural gas are we interested in?
+ Who needs the analysis data?
+ Methods for analyzing gases
+ How does a gas analyzer work?
+ Good installation practices
+ Calibration procedures
+ System maintenance
+ Fault analysis and recovery

Gas quality analyzer systems

Operation and maintenance

Course S4011

Overview

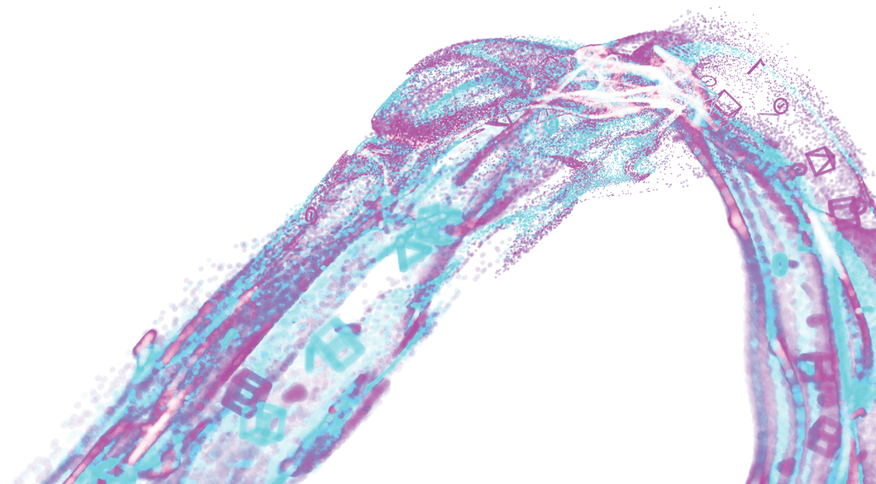
This **2-day** course provides students with a detailed understanding of the fundamental principles and various applications of gas chromatography. Key installation requirements will be highlighted, and analyzer component function, overall design, and system configuration will be explained. Good operating practices, calibration and repeatability procedures, routine, and breakdown maintenance will form an integral part of this course.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to gas analyzer systems
+ Theory of operation
+ Theory of chromatography
+ Sample conditioning
+ Component detection
+ Signal transfer and chromatogram interpretation
+ Controller operations
+ Communications interface
+ Timed event analysis
+ Calculations
+ Pre-calibration checks
+ Calibration and repeatability
+ Analyzer system maintenance



Gas ultrasonic flow meters

Design and operation

Course S4020

Overview

This **1-day** course provides students with a detailed understanding into Gas Ultrasonic Flow Meter design, component description, options, and applications. Flow Meter operating principles will be explained to build the calculations that will display the current flow rates and other valuable diagnostic information relevant to meter and fluid flow condition. Meter configuration, editing, and mode setting, will be supported by use of the latest Measurement Advisor Software.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to CALDON gas ultrasonic flow meters
+ Theory of operation
+ Ultrasonic flow meter design
+ Configuration and diagnostics
+ Meter calibration
+ Meter maintenance
+ Signal processing
+ Communications interface
+ Advanced diagnostics
+ Performance trending

Gas orifice flow meters

Operation and maintenance

Course S4030

Overview

This **1-day** course provides students with an in-depth understanding into differential pressure Gas Orifice flow meter operating principles. Meter installation, operation, routine plate inspections, and data configuration at the system flow computer will be explained. Problem diagnosis will be explained in terms of common process and mechanical issues. Routine maintenance and meter recertification will also be included.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to gas orifice flow meters
+ Theory of operation
+ Flow meter installation design
+ Set-up and configuration
+ Calibration and maintenance
+ Component replacement
+ Transmitter signal handling
+ Communications interface
+ Flow computer configuration
+ Good operating practices

MEASUREMENT SERVICES

Hydrocarbon liquid custody transfer metering systems

System design and operation

Course S5000

Overview

This **2-day** course provides students with a detailed understanding of the principles of fluid measurement for Hydrocarbon Liquids. Consideration of the correct Primary measuring device, its installation, operation, and instrumentation requirements will be explained in detail. The instructor will reference applicable standards, used for design, and to optimize system performance. This includes system calibrations, meter-proving practices, system maintenance, and application of good metering system operating practices.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to liquid flow measurement
+ Commercial and legal requirements
+ Principles of current liquid flow measurement techniques
+ Secondary instrumentation requirements
+ Liquid quality sampler systems
+ System design standards used
+ Metering operations
+ Meter proving
+ Calibration procedures
+ Maintenance procedures
+ Reporting and record keeping

Liquid quality sampling systems

Design and operation

Course S5010

Overview

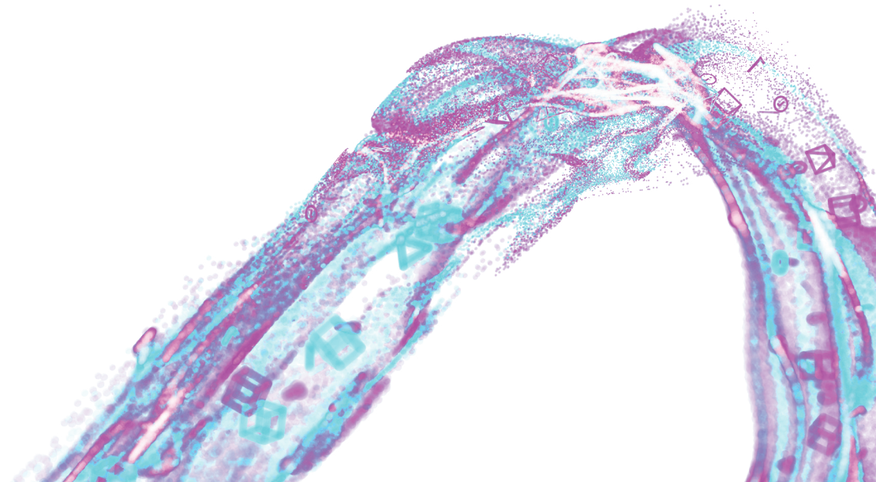
This **1-day** course provides students with a detailed understanding into the system design, installation, and component operating principles of JISKOOT liquid sampling technology. Installation accuracy requirements, reference to the international design standards, and calibration testing methods will be explained. Grab sampler operation will be explained with system configuration and control from JISKOOT's InSpec sampler controller or customer flow computer. Calibration, fault analysis and routine and breakdown maintenance will also be included.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to sampling systems
+ Why do we sample?
+ Accuracy requirements
+ System design features
+ Theory of operation
+ Grab sampler operation
+ InSpec controller basics
+ Operating considerations
+ Calibration testing
+ Basic system maintenance
+ Good operating practices



Liquid quality sampling systems

Operation and maintenance

Course S5011

Overview

This **2-day** course provides students with an in-depth understanding into the system design, installation, and component operating principles of JISKOOT liquid sampling technology. Installation accuracy requirements, reference to the international design standards, and calibration testing methods will be explained. Grab sampler operation and a practical demo, with system configuration and control from JISKOOT's InSpec sampler controller or customer flow computer will be covered. Calibration, fault analysis and routine and breakdown maintenance will also be included.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to sampling systems
+ Why do we sample?
+ Accuracy requirements
+ System design features
+ Theory of operation
+ Grab sampler operation
+ Secondary instrumentation
+ Inspec controller interface
+ Operating considerations
+ Calibration testing
+ System maintenance
+ Good operating practices

Liquid ultrasonic flow meters

Design and operation

Course S5020

Overview

This **1-day** course provides students with a detailed understanding into liquid ultrasonic flow meter design, component description, options, and applications. Flow meter operating principles will be explained to build the calculations that will display the current flow rates and other valuable diagnostic information relevant to meter and fluid flow condition. Meter configuration, editing, and mode setting, will be supported by use of the latest Measurement Advisor Software.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to CALDON liquid ultrasonic flow meters
+ Theory of operation
+ Ultrasonic flow meter design
+ Configuration and diagnostics
+ Meter calibration
+ Meter maintenance
+ Signal processing
+ Communications interface
+ Meter diagnostics
+ Performance trending

MEASUREMENT SERVICES

Liquid turbine flow meters

Operation and maintenance

Course S5030

Overview

This **1-day** course provides students with a detailed understanding of the design and operation of the liquid turbine meter. Pulse signal transfer and signal integrity processing by the system flow computer will be explained. Typical meter calibration procedures, as well as routine, and break down maintenance will be included in this course.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to turbine meters
+ Mechanical design
+ Installation requirements
+ Electrical connectivity
+ Flow computer interface
+ Application requirements
+ Pulse integrity
+ Meter proving
+ Performance trending
+ Turbine meter maintenance

Meter provers

Operation and maintenance

Course S5051

Overview

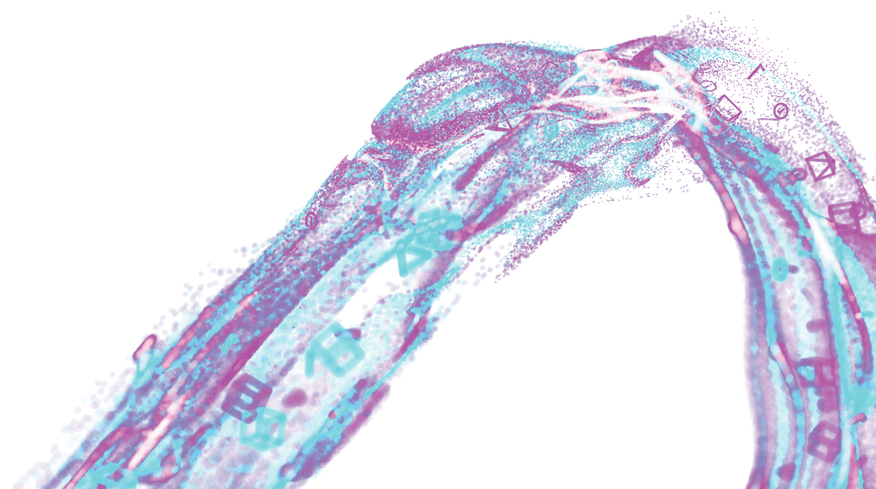
This **2-day** course provides students with an in-depth understanding into the operating principles, installation, and use of Pipe (Ball), and small volume (Piston) Provers. The control interface with the Prover Computer and 'Direct' and 'Master Meter' proving methods will be explained. Proof stage, status, abort conditions, and appropriate corrective actions will be discussed. Prover volume calibration, routine and breakdown maintenance will form an integral part of this course.

Prerequisites

A background in flow measurement or instrumentation is preferred.

Topics

+ Introduction to meter provers
+ Why do we prove?
+ Types of provers
+ Prover installation
+ Theory of operation
+ Design considerations
+ Accuracy considerations
+ Prover calibration
+ Prover applications
+ Prover maintenance



Solving challenges from the reservoir to refinery. One challenge at a time.

We collaborate with all stakeholders to make the production, transportation and processing of oil & gas simpler, safer, more secure, more productive and better understood from end-to-end. Sensia is making the advantages of industrial-scale digitalization and seamless automation available to every oil & gas company.

Now every asset can operate more productively and more profitably.

Enquiries

To discuss your service support needs and requirements, to request a service support quotation, or to schedule a service event, please contact your local Sensia office, or contact us directly at:

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