Water Flow Measurement & Control Techniques

This course is Designed, Developed, and will be Delivered under ISO 29990:2010 & ISO 9001:2015 Standards

14 - 16 Nov 2016  Jakarta
21 - 23 Aug 2017  Kampala
WHY CHOOSE THIS TRAINING COURSE?

Effective water transmission and distribution systems requires an understanding and appropriate application of Instrumentation and Process Control concepts. This course was designed to provide such understanding tailored to Water Flow Measurement & Control and cover their practical applications.

Sensors, Mechanical and Electrical Instrumentation are a key resource in industrial plants with multiple uses ranging from flow measurement, monitoring and control. The use of smart sensors, microprocessors, PLCs, SCADA systems and automatic measurement systems (AMS) are the latest and most important trends in water transmission and distributions systems.

This Water Flow Measurement & Control Techniques training course includes the fundamentals and practical applications of Water Measurement and Control Devices. In addition, the course covers control valves and electronic instrumentation and networking. The course ends with coverage of automatic measurement systems emphasizing wired and wireless communication technologies.

WHAT ARE THE GOALS?

- To provide fundamentals and practical applications of sensors, instrumentation and control valves for water transmission and distribution systems
- To provide the theoretical and practical knowledge to be able to match the desired instruments for specific applications
- To provide the theoretical and practical knowledge to be able to resolve problems involving accuracy and reliability of measurements
- To provide the processes for calibration, installation and troubleshooting of water measurement instruments
- To provide the fundamentals and practical applications of electronic instrumentation, industrial networks, SCADA and automatic metering systems (AMS)

At the conclusion of this training course, the attendees should have an in-depth knowledge on the principle of operation and configuration of all types of water flow meters covered in the course: invasive and non-invasive type, positive displacement, turbine, electromagnetic and ultrasonic meters. They should be able to choose the correct flow meter for a particular application and to resolve any ensuing problems in relation to unreliability or inaccuracy of flow meter readings and understand the various processes involved in the calibration of liquid flow meters. They should also have a practical understanding of control valves, smart flow meters and automatic meter systems.
Daily Topics

**DAY ONE**
Introduction and Mechanical Flow Meters

- Introduction to Course, Expectations from Participants, Review of Programme
- Introduction of Sensors, Transducers and Instrumentation Systems
- Examples
- Flow Terms and Definitions: Mass flow, Volumetric flow rate, Pressure, Viscosity, Turbidity, Units, Laminar and Turbulent flows, Reynolds number, Bernoulli’s equation, Pipe Velocity Distributions, Pipe Fitting Losses
- Examples
- Instrumentation Terms: Accuracy, Range, Span, Maximum error, Hysteresis, Repeatability and Reproducibility, Sensitivity, Resolution, Response time, Calibration Graphs
- Examples
- Principles of Water Flow Measurement & Control

**Mechanical Flow Meters:**

- Devices Principle of Operation, Application and Installation Considerations of Invasive Types:
  - Coriolis Flow Meter
  - Differential Pressure Type Flow Meters
    - Orifice Plate
    - Venturi Tube
    - Flow Nozzle
    - Dall Flow Tube
- Installation considerations, Maintenance and Troubleshooting of Water Meters.

**Workshop #1: Case Study, Practical Exercises, Videos.**

**DAY TWO**
Electronic Flow Meters and Control Device

- Insertion Magnetic Flow Meter: Operating Principles, Advantages, Disadvantages, Installation
- Maintenance and Calibration

**Control Devices**

- General Categories of Control Valves
- Rangeability, End Connections, Shutoff Capability
- Valve Sizing
- Choked Flow
- Control Valve Sizing and selection
- Control Valve Cavitation and Noise
- Piston, Electric and Hydraulic Actuators
- Positioners
- Live Loading
- Diagnostic Testing of Control Loops
- Air-Operated Valves Diagnostics
- Motors-Operated Valves Diagnostics

**Workshop #2: Case Study, Practical Exercises, Videos.**
Daily Topics

DAY THREE
Smart Sensors, Transmitters and AMR Systems

NOTE: This outline uses the HART industrial network but it could be replaced with any other network such as Profibus or Foundation Fieldbus

- Microprocessors and Microcomputer Systems
- Smart Sensor Systems
- Intelligent (Smart) Transmitters
- Microprocessor-Based Transmitters (Smart Transmitters)
- Transmitter Options: 20 mA Current Lop, Fieldbus, Wireless
- Smart (Intelligent) Pressure Transmitters
- Advantages of Intelligent Instrumentation
- Comparison Between Intelligent and Non-Intelligent Instrumentation
- Stand-Alone Controllers
- Self-Tuning, Sequencing and Networking
- HART Protocol
- Fieldbus Protocols: Profibus, Foundation Fieldbus
- WirelessHART Protocol
- Supervisory Control and Data Acquisition (SCADA) System
- Other Wireless sensors and transmitters
- Wireless measurement readers
- Automatic meter reading
- Automatic meter systems

Workshop #3: Case Study, Practical Exercises, Videos
Please use BLOCK CAPITALS to fill in this form. It is important that you read carefully through all information before starting to complete the form.

**REGISTRATION DETAILS**

Family Name

First Name (Mr./Ms.)

Position

Company

Mailing Address

Telephone

Mobile

Fax

Email

**AUTHORISATION**

Authorised by

Position

Mailing Address

Telephone

Mobile

Fax

Email

**HOTEL ACCOMMODATION**

Hotel accommodation is not included in the Registration Fee. A reduced corporate rate and a limited number of rooms are available for attendees wishing to stay at the hotel venue.

Please make your request for accommodation **at least 3 weeks** prior to the commencement of the course.

**CERTIFICATION**

A Certificate of Completion will only be awarded to those delegates who attend the entire course.

**COURSE SCHEDULE**

14 - 16 Nov 2016  Jakarta
21 - 23 Aug 2017  Kampala

**REGISTRATION FEES**

US$ 3,500/ - per participant

This fee is inclusive of Documentation, Lunch and Refreshments

**MODE OF PAYMENT**

- Please invoice my company
- Please invoice me
- Cheque payable to “PetroKnowledge Limited”

**WAYS TO REGISTER**

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Circumstances beyond the control of PetroKnowledge may necessitate postponement, change of venue or substitution of the Instructor. As such, PetroKnowledge reserves the right to implement such amendments.