



Training Course:
***WATER FLOW MEASUREMENT & CONTROL
TECHNIQUES***

*16 - 20 February 2025
Alexandria (Egypt)*

Training Course: WATER FLOW MEASUREMENT & CONTROL TECHNIQUES

Training Course code: EW234793 From: 16 - 20 February 2025 Venue: Alexandria (Egypt) - Training Course Fees: 4750 Euro

Introduction

Effective water transmission and distribution systems require an understanding and appropriate application of Instrumentation and Process Control concepts. This training 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 is the latest and most important trend in water transmission and distribution systems.

This 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.

Course Objectives

By the end of this training course, the participants will be able to:

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

After this training course, the attendees should have in-depth knowledge of the principle of operation and configuration of all types of water flow meters covered in the course: invasive and non-invasive types, positive displacement, turbine, electromagnetic, and ultrasonic meters. They should be able to choose the correct flow meter for a particular application and resolve any ensuing problems about 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.

Training Methodologies

This training course will utilize a variety of proven online learning techniques to ensure maximum understanding, comprehension, and retention of the information presented.

Target Audience

This training course is suitable for a wide range of professionals in the water industry, but will greatly benefit:

- Project managers
- Professionals involved in the regulatory monitoring of water quality
- Engineers involved in the monitoring and maintenance of water systems in the Process Industries
- Professionals involved in the drafting of guidelines on water quality
- Process engineers in Sewage Treatment Plants STPs
- Professionals responsible for water systems in the Healthcare sector and the Hospitality industry

Course Outlines

DAY 1

INTRODUCTION AND MECHANICAL FLOWMETERS

- Introduction to the course, expectations from participants, review of the program
- Introduction o 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

Day 2

MECHANICAL FLOWMETERS

- Devices; the principle of operation, application, and installation considerations of Invasive types:
 - Coriolis Flowmeter
 - Differential Pressure type flow meters
 - Orifice plate
 - Venturi tube
 - Flow nozzle
 - Dall flow tube
- Positive displacement flow meters Volumetric Rotary Piston Type: the principle of operation, characteristics, sizing, and Installation.
- Turbine flow meters: Single jet, Multijet, Woltman, characteristics, Calibration Curve, Sizing & Selection, Installation & Accessories.
- Testing and calibration of water meters.
- Installation considerations, Maintenance, and troubleshooting of water meters.

DAY 3

ELECTRONIC FLOW METERS AND CONTROL DEVICE

- Electromagnetic Flow Meter: Theory of Operation, applications, limitations, characteristics, Installation recommendations.
- Ultrasonic Flow Meter Transit Time Measurement: Prerequisites for measurement, Operating Principles,

transducers, design variations, size ranges and limitations, applications & performance, installation, and troubleshooting.

- Insertion Magnetic Flow Meter: Operating principles, Advantages, Disadvantages, installation.
- Maintenance and calibration

Day 4

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

DAY 5

SMART SENSORS, TRANSMITTERS, AND AMR SYSTEMS

- Microprocessors and Microcomputer Systems
- Smart Sensor Systems
- Intelligent Smart Transmitters
- Microprocessor-Based Transmitters Smart Transmitters
- Transmitter Options: 20 mA Current Loop, 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
- Wireless HART Protocol
- Supervisory Control and Data Acquisition SCADA System
- Other Wireless sensors and transmitters
- Wireless measurement readers
- Automatic meter reading
- Automatic meter systems

Registration form on the Training Course: WATER FLOW MEASUREMENT & CONTROL TECHNIQUES

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