



المركز العالمي للتدريب والتطوير
International Centre For Training & Development



ICE028

Instrumentation for Non-Instrumentation Engineer



ACTVET
Abu Dhabi Centre for
Technical and Vocational
Education and Training
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Course Introduction:

Instrumentation is the science and art of measuring the value of some plant parameters such as pressure, flow, level or temperature and supplying a signal that is proportional to the measured parameter. The output signals are standard signal and can then be processed by other equipment to provide indication, alarms or automatic control. This course will clearly explain the concepts and implementation of instrumentation. It will identify and define the physical properties that must be considered in the proper installation, calibration and use of a measurement device, with ample information on the parameters that must be adapted to achieve accuracy, regardless of the device's make and model.

The course is designed to provide a good overview of the instrumentation technology to non-instrumentation engineers. Further, the course can serve as a refresher for instrumentation engineers involved with process measurement and control equipment. The course covers a wide range of topics such as theory and application, pressure measurement, level measurement, temperature measurement, flow measurement, flow meter selection & costs, basic principles of controls systems, modes of control, typical applications, digital field communications, smart transmitter, P&ID, wiring schematics & diagrams, control valves and process considerations.

The course includes a practical workshop on control valve computer programming that covers the selection, sizing and actuator force diagram. Each topic of the course will be discussed in a logically organized manner and contains an abundance of realistic problems, examples and illustrations to challenge the participants to think and encourage them to apply this knowledge to the solution of practical problems.

Course Objectives:

Upon successful completion of this course, the delegates will be able to:

- Apply and gain a good working knowledge on the theory & application of instrumentation including the familiarization of basic measurement & control theory used in the implementation of instrumentation
- Implement the basic principles of pressure measurement, electrical & mechanical pressure transducers and the future technologies related to pressure measurement
- Enumerate the main types of level measurement, installation considerations and the future technologies related to level measurement
- Explain the principles of temperature measurement, thermistors and the future technologies related to temperature measurement
- Carryout the principles of flow measurement, flowmeter classification and future technologies related to flow measurement

- Explain the initial and cost considerations as well as the proper meter selection in the selection & cost of flowmeter and enumerate the typical applications used in instrumentation
- Enumerate the basic control concepts including the variables, basic elements and feedback control as well as the models of control related to instrumentation
- Identify the different field communications used in instrumentation and become familiar with P&ID, wiring schematics & diagrams
- Apply the principles of control valves including its body types, cavitation, valve coefficient and control valve selection
- Enumerate the actuators & accessories of control valves including the main type of actuators and positioners
- Identify the process considerations, materials selection and modes of failure in instrumentation as well as the safety considerations
- Distinguish current trends in instrumentation as well as learn the principles of density measurement and temperature notes

Who Should Attend?

This course is intended for all non-instrumentation engineers who have to perform occasional instrumentation responsibilities as part of their job. The course also provides a good introduction for newly graduated instrumentation engineers or others who have a good working knowledge of the fundamentals but have limited operating experience.

Course Outline:

Day 1:

- **Introduction to Instrumentation**
 - Fundamentals of Process Control
 - The Basics of Piping and Instrumentation Diagrams
- **Basic Instrumentation Symbols**

Day 2:

- **Basic Instrumentation Electricity and Safety**
- **Temperature Instrumentation**
 - What is Temperature, Heat and Energy
 - Why are Thermal Expansion Thermometers Used
 - What are Electrical Thermometers

Day 3:

- **Pressure Instrumentation**
 - How do Pressure Instruments Work and What Should I Know About Them
 - Where Would I Find These Pressure Measuring Applications
- **Level Instrumentation**
 - What are Level Devices or Level Instruments and How Do They Work
 - Why are Mechanical Instruments Important

Day 4:

- **Flow Instrumentation**
 - What Is So Important About Understanding Fluid Flow Properties
 - What and Why: Differential Pressure Flow meters

Day 5:

- **Final Elements and Instrumentation**
 - Describe the Basic Understanding of What Final Elements Are and How Instrumentation Functions with These Final Elements:
 - Control Valves
 - Regulators and Dampers
 - Actuators and Positioners
 - On/Off Control Actions
 - Variable-Speed Drives
 - Electric Powers Controllers
- **Safety System Instrumentation to Prevent Injuries and Fatalities**
 - What are Safety Systems on Machinery and Equipment and Why are They Important to an Instrumentation Technician
 - What the Beginner Instrumentation Tech Should At Least Know About Safety devices and Electrical Safety Standards

Course Certificate

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Fees:

To be advised as per course location. This rate includes participant's manual, and-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session