

PRACTICAL INSTRUMENTATION FOR AUTOMATION AND PROCESS CONTROL



YOU WILL LEARN HOW TO:

- Specify and design instrumentation systems for pressure, level, temperature and flow
- Correctly select and size control valves for industrial use
- Predict and avoid the problems with installing measurement equipment
- Troubleshoot instrumentation systems and control valves
- Isolate and rectify instrumentation faults
- Describe most of the major technologies used for instrumentation and control valves

WHO SHOULD ATTEND:

- Graduate Engineers
- Electrical Engineers
- Project Engineers
- Design Engineers
- Instrumentation and Design Engineers
- Electrical Technicians and Technologists
- Experienced Electrical Tradespersons and Artisans
- Electricians
- Experienced Fixed Plant Operators



The Workshop

This workshop is for engineers and technicians who need to have a practical knowledge of selection, installation and commissioning of industrial instrumentation and control valves.

In many respects a clear understanding and application of these principles is the most important factor in an efficient process control system. You can only achieve excellent control of your processes when your instrumentation provides the correct information. This would involve the design, specification and implementation of control and measurement equipment.

The workshop focuses on real applications, with attention to special installation considerations and application limitations when selecting or installing different measurement or control equipment.

Pre-requisites

A knowledge of fundamental electrical concepts would be useful.

Practical Sessions

This is a practical, hands on workshop enabling you to work through practical exercises which reinforce the concepts discussed.

Practical sessions include:

PRESSURE

- Hydrostatic pressure
- Pressure sensors in pipe with isolation valve, check response and accuracy
- Compare gauge, absolute and differential pressures
- Pressure calibration

LEVEL

- Point detection with level probes, vibrating and conductive
- Level measurement with capacitive probe
- Ultrasonics, configure, test and commission

TEMPERATURE

- Temperature response and accuracy
- RTD, 2/3/4 wire comparison
- T/C, ref. junction, grounded, sheathed
- T/C, extension leads compared with compensation leads

SIMULATION

- The basis of signal simulation
- Transmitter simulation
- Transducer simulation

CALIBRATION

- The basis of transmitter calibration
- Zero and span adjustment

The Program

INTRODUCTION TO PROCESS MEASUREMENT

- Basic measurement concepts
- Definition of terminology
- Measuring instruments and control valves as part of the overall control system
- Pressure, level, temperature and flow overview
- Overview of control valves

PRESSURE MEASUREMENT

- Principle of pressure measurement
- Pressure sources
- Pressure transducers and elements
- Specifications

Practical session

- Installation considerations
- Impact on the overall control loop
- Future technologies

LEVEL MEASUREMENT

- Principles of level measurement
- Simple sight glasses
- Buoyancy tape systems
- Hydrostatic pressure
- Ultrasonic measurement
- Radiation measurement
- Electrical measurement
- Density measurement
- Installation considerations
- Impact on the overall control loop
- Future technologies

Practical session

TEMPERATURE MEASUREMENT

- Principles
- Thermocouples
- Resistance Temperature Detectors (RTDs)
- Thermistors
- Liquid in glass, filled, bimetallic
- Pyrometers
- Installation considerations
- Impact on the overall control loop
- Future technologies

FLOW MEASUREMENT

- Principles of flow measurement
- Open channel flow measurement
- Oscillatory flow measurement
- Magnetic flow measurement

Practical session

- Positive displacement
- Ultrasonic flow measurement
- Mass flow measurement
- Installation considerations
- Impact on the overall control loop
- Future technologies

Practical session

CONTROL VALVES

- Principles of control valves
- Control valve types
 - Globe valves, cage valves, butterfly valves, ball valves
- Control valves selection
- Control valve bodies

Practical session

- Control valves characteristics/trim
- Control valve noise and cavitation
- Actuators and positioners operation
- Valve calibration and stroking
- Installation considerations
- Impact on the overall control loop
- Future technologies

Practical session

PROCESS CONSIDERATIONS

- Transmitters
- Noise
- Materials of construction

INTEGRATION OF THE SYSTEM

- Calculation of individual instrument error and total error for the system
- Integration of the pressure, level, temperature and flow systems
- Integration of new smart subsystems with data communication links
- Testing and commissioning of the subsystems

SUMMARY, OPEN FORUM AND CLOSING

