Process Measurement Fundamentals

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This five-day course begins with a look at fundamentals of measurement. A brief review of basic electronics is provided. An overview of the modern techniques of measuring pressure, temperature, flow, and level is covered. The use of these instruments in PID process control loops is emphasized. Troubleshooting and tuning of controllers and the calibration of the loop transmitters is also included in the course.

I. Fundamentals of Measurement

- Terminology
- Block Diagrams
- Open Loop Control System
- Closed Loop Control Systems
- Feedback

II. Pressure Measurement

- Principals of Pressure Measurement
- Basic Pressure Measurement Devices
- Pressure Transmitters

III. Temperature Measurement

- Principals of Temperature Measurement
- Basic Temperature Measuring Devices
- Thermocouples and RTDs
- Temperature Transmitters

IV. Flow Measurement

- Principals of Flow Measurement
- Primary Flow Measuring Devices
- Flowmeters

V. Level Measurement

- Principals of Flow Measurement
- Hydrostatic Level Measurement
- Electronic Flow Measuring Devices

VI. Control Systems

- Controller Terminology
- Two-Position Control
- Proportional Control
- Integral Control
- Derivative Control
- PID Controllers
- PID Controller Tuning

VII. Pneumatic Controllers

- Basic Mechanical Devices
- Pneumatic Instrument Components and Subassemblies
- Flapper/Nozzle, Pilot Valve, and Pneumatic Relay
- Force Balance Instruments
- Motion Balance Instruments
- Pneumatic Measurement Instruments
- Pneumatic Measuring Arrangements
- Pneumatic Control Instruments
- Control Valves and Actuators
- Pneumatic Control Arrangements
- Transducers and Converters

VIII. Electronic Controllers

- Analog Controllers
- Digital Controllers
- Stand Alone Controllers

IX. Calibration Techniques

- Terminology
- Use of Electronic Calibrators
- Communicators
- Calibration Procedures

X. Troubleshooting Control Loops

- Troubleshooting Impulse Lines
- Troubleshooting the Transmitter
- Troubleshooting the Power Supply
- Troubleshooting the Loop Setup
- Troubleshooting DCS Interconnections