

# Basic Instrumentation for Operations

Knowledge & Awareness = Operate Better, Longer, Safer

## COURSE OUTLINE:

Basic Instrumentation for Operations increases the **level of awareness** and **understanding** of the most commonly used instruments in the process industry.

The objective is to **streamline the troubleshooting process** by providing a 'common language' between operations and maintenance. Effective communication will **accelerate repairs** and **minimize downtime**.

## WHO SHOULD ATTEND:

- Operators
- Shift Supervisors
- Process Engineers
- Production managers



Date: **October 16, 2019**  
(Lunch & Refreshments Included)

Time: **8am - 6pm**

Cost: **\$300 CAD**

Location: **University of Ontario Institute of Technology, Room ERC1092  
2000 Simcoe Street North  
Oshawa, ON, L1H7K4**

## AGENDA

### Introduction to Instrumentation

- What is an instrument?
- 4-20 mA
- Calibration
- Dropper Resistor
- HART Communication
- 2-Wire & 4-Wire devices
- Troubleshooting '4-20 mA' Input Signals

### Pressure Measurement

- What is pressure?
- Pressure Measurement Units
- Absolute vs. Gauge Pressure
- Differential Pressure Measurement
- Troubleshooting Pressure Transmitters

### Flow Measurements

- dP Flow Measurements (Orifice Plate)
- Velocity Flow Measurement (Magnetic, Vortex & Ultrasonic flow meters)
- Mass Flow Meters (Coriolis & Thermal)
- Troubleshooting Flow Meters

### Level Measurements

- dP Level Measurements
- Bubbler Level Measurements
- Radar (Non-Contacting and Guided Wave)
- Ultrasonic Level Measurements
- Troubleshooting Level Measurements

### Temperature Measurements

- RTD's & Thermocouple
- Cold Junction Compensation
- RTD vs. Thermocouples
- Troubleshooting Temperature measurements

### Regulators

- What is a Regulator & How Does it Work?
- Self-Operated vs. Pilot Operated Regulators
- Droop

### Control Valves

- CV and Flow Characteristics
- Rotary and Sliding Stem Valves
- Valve Cavitation and Flashing
- Positioners, Actuators, and I/P's
- Troubleshooting Control Valves

### On/Off Valves

- Solenoid Valves
- Proximity and Limit Switches
- Restrictors and Volume Boosters

### Closing the Loop

- PID Control
- Controller Modes
- PID Tuning
- ISA Symbols

