

ROXBY



Training Solutions

Measurement
And
Control Appreciation

Course Content

Aim

To provide an appreciation of the operation and application of process plant instrumentation used for the measurement and display of the main process variables of pressure, level, flow and temperature. To also provide an appreciation of the principles of industrial automatic process control and the practical applications of this on plant control.

Pre-requisite

Suited to those personnel who require to be acquainted with the actual work carried out by instrument personnel and who are involved with instrumentation personnel on a daily basis.

Course Duration

The course is 10 days in duration.

Optimum Number

A maximum of 8 delegates per course.

Course Language

The course is delivered in English. Therefore candidates must have a good standard of both written and verbal English.

Courses can be delivered in other languages however, this would need to be discussed prior to acceptance on the course. It is the responsibility of the person making the booking to make Roxby aware of this requirement.

Training Aids

A Roxby presentation, using course notes and discussion. Hands on practical exercises are incorporated within the delivery using purpose-built rigs and simulators.

Assessment

Delegates will complete practical assignments to ensure they have fully understood the concepts delivered. Upon successfully completing, delegates are awarded with A Roxby Training Limited Certificate. Should an accredited option wish to be achieved, an ECITB training certificate can be issued.

Course Syllabus

Week One

Introduction

Course Welcome and Introduction To The Role Of The Instrument Technician

Health and Safety Principles

Incorporates ECITB CO 02 Unit

Health and Safety Principles – Work Safely and Minimise Risk

(If candidates already uphold safety qualifications equivalent to standard this unit is not required)

Pressure Measurement

Incorporates ECITB TS MPS I&C – 04 & 13 Units

Pressure Measurement Principles, Units, Types and Conversions

Liquid Head Devices (Manometers)

Elastic Deformation Elements (Diagrams, Capsules, Bellows)

Bourdon Tube Gauges ("C" type, Spiral, Helical, Compound and Duplex)

Installation of Bourdon Tube Gauges

Pressure Calibration Standards (DWT, Venier Manometer and Standard Gauge)

Piezo Electric Devices

Calibration Procedures, Errors and Correction

Capacitance Displacement Transducers

Pressure Switches

Practical Training

Pneumatic & Electronic Transmission

Systems

Incorporates ECITB TS MPS I&C – 04 & 13 Units

Transmission Signals

The Pneumatic DP Transmitter

Bench Calibration

Flapper & Nozzle

Electronic Display Devices

Two Wire Transmission System

SMART (Hart) Transmission

Transmission Signal Converters (I to P and P to I)

Electronic Transmitter (Force Balance)

Practical Training

Level Measurement

Incorporates ECITB TS MPS I&C – 04 & 13 Units

Why Measure Level?

Simple Devices

Sight Glass

Hydrostatic Methods (Wet Leg and Dry Leg)

Interface Level

Purged Dip Pipe Level Measurement Principle

Buoyancy Method (Floats and Displacer)

Capacitor Methods

Ultrasonic Methods

Radar Level Gauges

Radioactive (Nuclear)

Load Cells

Solids

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Flow Measurement

Incorporates ECITB TS MPS I&C – 04 & 13 Units

Rate and Quantity of Flow

Types of Flow

Laminar, Transient and Turbulent Flow

Quantity Displacement Meters

Constant Area, Variable Pressure Devices

Square Root Law and Extraction

Constant Head, Variable Area Devices

Inferential (Velocity) Flowmeters

The Vortex Flowmeter

Mass Flow

Installation Practices & Flowmeter Selection

Temperature Measurement & Electrical Methods of Temperature Measurement

Incorporates ECITB TS MPS I&C – 04 & 13 Units

Temperature Units and Scales

Liquid, Gas and Vapour Filled Systems

Bimetal Thermometers

Resistance Thermometers

The Wheatstone Bridge 2, 3 and 4 Wire Systems

Thermocouples

Reference Junction Compensation

Compensating and Extension Cable

Week Two

Control Valves and Actuators

Incorporates ECITB TS MPS I&C – 04 & 13 Units

Introduction to Control Valves Actuators and Positioners

Construction

Valve Components

Control Valve Operation and Action

Control Valve Actuators

Valve Positioners

Forced Balance Positioner

Top Mounted Positioner

Split Range Operation

Spring and Diaphragm Actuators

Single and Double Port Valves

Control Valves Trims and Characteristics

Smart positioners

Control Valve maintenance

Closed Loop Control

Incorporates ECITB TS MPS I&C – 04 Unit

The Elements of a Control Loop

Process Control Terms

Principles of the Feedback Loop

Open Loop Control

Controller Actions

Control Loop Stability

Modes of Control

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On/Off (2-Step) Control

Proportional Action

Integral Action

P+I Controllers

Derivative Action

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Tuning Control Systems

Incorporates ECITB TS MPS I&C – 04 Unit

Techniques for Tuning Controllers

Closed Loop Methods

Ultimate Sensitivity Method

Damped Oscillation Method

¼ Optimum Response Method

Complex Control

Cascade Control

Ratio Control

Variable Ratio Control

The importance of Calibration

Incorporates ECITB TS MPS I&C – 04 Unit

Calibration Procedures

Calibration Errors and tolerances.

Recording Calibration Documentation

PLC's

Incorporates ECITB TS MPS I&C – 15 Unit

Types of PLC

System Scale

Ladder Logic

PLC Basic Programming

Fault Finding on Process Control

System

Incorporates ECITB TS MPS I&C – 15 Unit

Systematic Fault Diagnosis Checks

Safe Working Procedures

Recording Faults into Maintenance Records

Course Evaluation

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