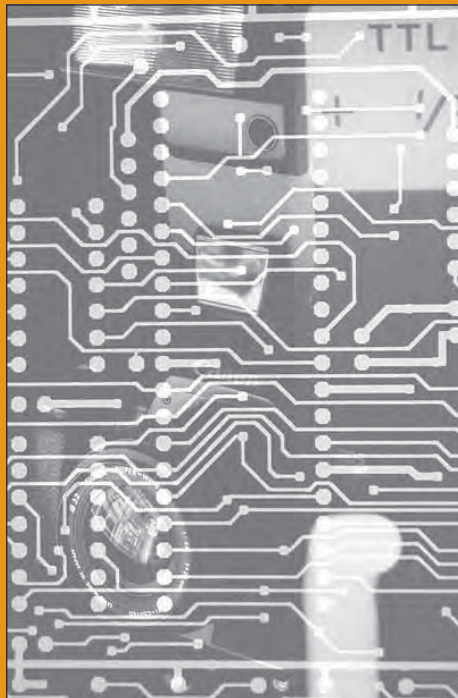


INSTALLATION, CALIBRATION AND MAINTENANCE OF ELECTRONIC INSTRUMENTS



YOU WILL LEARN HOW TO:

- Apply correct practice to installation, calibration and maintenance of instruments
- Calibrate electronic transmitters and controllers
- Configure instruments correctly to vendor instruction sheets
- Apply Intrinsic safety techniques to instrumentation installation
- Maintain instruments correctly
- Connect instrument wiring correctly
- Predict and avoid the problems with installing measurement equipment
- Troubleshoot, isolate and fix electronic instrumentation problems
- Specify instrument and loop documentation requirements and standards to vendors
- Fault find with drawings
- Design and install safe working systems in hazardous areas
- Apply ISO 9000 to maintenance practices
- Effectively apply the principles of analog meters, digital meters and oscilloscopes
- Carry out simple repair procedures for the correction of faults on instrument systems where possible

WHO SHOULD ATTEND:

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



The Workshop

This workshop is designed for engineers and technicians from a wide range of abilities and backgrounds and will provide an excellent introduction and hands-on experience in installation, calibration, commissioning and maintenance of electronic instruments. The workshop is initiated with coverage of the basics on electrical measurements and some tips and tricks. Instrument performance and calibration principles are then covered with rules for calibrating transmitters. Hereafter the procedures for calibrating and installing smart transmitters are covered. Typical documentation requirements for instruments are examined with a focus on instrument data sheets, P&ID's and wiring diagrams. During the life span of any plant, a multitude of different vendors will supply plant modifications and equipment as the plant is continuously enhanced. The quality of the documentation produced will vary enormously with each new supplier. Instruments in hazardous areas are then detailed. The course is then finalised with a discussion on integration of the entire system and testing and commissioning procedures for instruments detailed.

Pre-requisites

A knowledge of fundamental electrical concepts would be useful.

Practical Sessions

Basic Measurements

- Measure and troubleshoot voltage, current, resistance problems
- Open and Short circuit tips and tricks

Simulation

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

Calibration

- The basis of transmitter calibration
- Zero and span adjustment
- Performance - accuracy and error calculations

Fieldbus and Digital Transmitter

- Configure
- Rerange
- Perform digital trim

PID Feedback Loops

- Wire up and install a PID feedback loop
- Check the loop out
- Tune the loop

The Program

MAINTENANCE

- Corrective/preventative/predictive
- Troubleshooting
- Meaning of ISO 9000 and 9001

ELECTRICAL MEASUREMENTS

- Use of multimeter
- Voltage/current and resistance measurement
- Analog and digital meters
- Oscilloscopes
- Current to voltage conversion
- Multiple Loop devices
- Diodes and resistors
- Soldering and component preparation
- Open and short circuits
- Testing of diodes/DIACS/TRIACS/
- Components out of tolerance
- Isolation and earthing

INSTRUMENT PERFORMANCE

- Basic Measurement and control concepts
- Accuracy/Range/Hysteresis/Linearity/ Repeatability/Response/Dead Time
- Zero/Span
- Process Dynamics
- Specifications

CALIBRATION PRINCIPLES

- Block Diagrams
- Standards for calibration
- Five Point calibration
- Charts

FUNDAMENTALS OF PROCESS MEASUREMENT

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

CALIBRATION OF TRANSMITTERS

- Shop calibration
- Electro pneumatic calibrators
- In-shop or Field
- Temperature - Calibration (RTD/ Thermocouples)

PID CONTROLLERS

- Direct/reverse acting
- P, I and D Control
- Spanning and Range
- Instrument/Controller and Process Gains

SMART AND FIELDBUS TRANSMITTERS

- Operation
- Configuration
- Reranging
- Characteristics
- Trimming

TRANSDUCERS AND TRANSMITTERS

- Fundamentals
- Calibration
- Interfacing to instrument

INSTRUMENT DOCUMENTATION AND P&ID'S

- Control Loops on the P&ID
- Instrument Lists
- Wiring diagrams
- Schedules & lists
- Data sheets
- Loop diagrams
- Standards & symbols

HAZARDOUS AREAS

- Explosion Consequences
- Definition of Hazardous Area
- Classification of Apparatus
- Apparatus Grouping and Temperature
- Principles of Ex Protection
- Requirements for IS Systems
- Noise and Interference Control
- Earthing requirements
- Static Protection
- Lightning Protection

MAINTENANCE, FAULT FINDING AND REPAIRS OF EX EQUIPMENT

- Planned Maintenance
- Use of Tools
- Procedures
- Safe Methods
- Test equipment suitability

STANDARDS, CERTIFICATION, MARKING AND APPROVAL

- Authorities
- Marking and identification
- Apparatus Certification

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
- Procedures
- Testing and commissioning
- Start up

SUMMARY, OPEN FORUM & CLOSING

