



NARGAN
ACADEMY



Instrumentation & Process Control Fundamentals (Level-I & II)

CONTACT US:



Nargan Academy



+98 933 638 1443



info@academy.nargan.com



WHY CHOOSE THIS TRAINING COURSE?

This course includes instruction on the fundamentals of instrumentation and controls as they apply to the oil and gas industry. Instrumentation and controls provide the basic building blocks for all automated control systems which we observe in every modern operating oil and gas facility. Solid robust and reliable instrumentation and controls not only ensures efficient and profitable plant operations, but also includes safe functionality of the process, protection of the environment and regulatory compliance when required. This course provides the opportunity for the participants to obtain a solid understanding of various technologies used for process measurements, final control elements and basic regulatory controls, including an understanding of common pitfalls related to design, maintenance and operational issues of instrumentation and controls.

WHO IS THIS TRAINING COURSE FOR?

This course focuses on instrumentation and controls used in the oil and gas process industries. The knowledge and understanding provided is typically required by engineers and technologists in the design phase and by operations and maintenance staff once facilities are up and operating. This course is suitable for anyone with an interest in wanting to know how instrumentation and control systems should be designed, maintained and improved. This provided knowledge can also be used in assessing process safety, emergency situations and regulatory compliance issues.

WHAT ARE THE GOALS?

- This training course will provide participants with the opportunity to understand how process measurements and controls can assure the reliable, efficient and safe operation of their facilities.
- Without basic I&C knowledge technicians, Junior I&C engineers, facility engineers, are often left with only a minimal understanding of I&C fundamentals. A greater understanding of these fundamentals is a requirement for the improvement of plant operations, the analysis of emergency situations and the assessment of safety, environmental and regulatory compliance issues such as the ones related to Process Hazards Analysis / HAZOP studies.
- This workshop will provide the foundation for basic level learning and consistent and improved communications between staff.
- This course will provide improvement in quality and consistency at the facility, which will enhance the other processes that rely on instrumentation and controls.



COURSE SYLLABUS (40 HOURS)

- Level – I (25 HOURS)
 - Familiarity with EPC projects and the list of basic and detail documents
 - Familiarity with documents design stages and documents generation prerequisites
 - Instrumentation – Measurements
 - Signals and Standards
 - Indication and Recording Equipment
 - Smart Transmitters

- Level-II (15 HOURS)
 - Instrumentation – Actuators & Controllers
 - Pneumatic Instrument Equipment
 - Review of I&C detail design of documentation and collaboration between departments
 - Control and On/Off valves
 - Basic Principles of Closed Loop Control Systems
 - Types of Control



Payam Zehsazian

- BSc. In Electrical/Electronic Engineering, from University of Saveh
- More than 20 years' experience in the field of oil and gas Instrumentation and control system.
- Project Manager and Instrumentation & control system PSL at Chagalesh Co. Involved In Bazargan gas metering system and Ilam gas refinery.
- I&C Head engineer in South Azadegan (Wellhead facilities with High Integrity Pressure Protection system) projects at PEDEC.
- I&C Head engineer in Haftkel – South Azadegan & Naft shahr projects at OEID.
- Daniel / Emerson process Management service engineer in IRAN.
- Experience in Commissioning-Startup and maintenance of Gas Analyzers at Emerson.

THE COURSE CONTENT

Level- I

Day One

- Familiarity with EPC projects and the list of basic and detail documents
- Familiarity with documents design stages and documents production prerequisites

Day Two

- Instrumentation – Measurements
- Process Measurement
 - Temperature – Resistance, Thermocouple
 - Pressure – DP Cells, Gauge, Differential, Absolute
 - Level – Head Pressure, Capacitive &...
 - Flow – Orifice Plate, Magflow, Vortex &....
- Signals and Standards:
 - Pneumatic Signals
 - Voltage Signals
 - Current Loops
 - Loop Connections
 - Power Supplies

Day Three

- Indication and Recording Equipment
 - Digital and Analogue Indicators
 - Installation and Calibration
 - Zero adjustment
 - Span adjustment
 - Standard (calibration) equipment
 - Commissioning and bringing on-line
- Smart Transmitters

Setting up and calibrating using a Smart Transmitter Safety procedures will be covered at each stage and practical exercises will cover the use of isolating/equalizing manifolds on flow systems, the use of pockets in conjunction with temperature probes etc. The implications of working on sensors which form part of a control loop will also be covered along with recommended safe working procedures



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THE COURSE CONTENT

Level- II

Day One

- Instrumentation – Actuators & Controllers
- Valves & Actuators
- Pneumatic Instrument – Components:
 - Flapper/Nozzle
 - Air Relays
 - Bellows
 - Booster Relays
- Pneumatic Instrument – Equipment
 - I/P Convertors
 - P/I Transmitters
 - P/P Transmitters
- Review of I&C detail design of documentation and collaboration between departments

Day Two

- Control & On/off valves
 - Types, Component Parts
- Control Valve Actuators
 - Direct Acting
 - Reverse Acting
 - Double Acting
- Control Valve Positioners
 - Types of Positioner
 - Fault-Finding
- Valve Characterization
 - PID Controllers
- Basic Principles of Closed Loop Control Systems
 - Feedback in a control system
 - Terminology in control systems – Set point, Process Variable, Output
 - Controller operating modes – Automatic, Manual, Remote, Internal
 - Basic closed loop systems and their operation
- Types of Control
 - Open loop, closed loop, Feed-forward control
 - Wiring and connection requirements