

COURSE OVERVIEW IE0738 Field Measurement Devices

Course Title

Field Measurement Devices

Course Date/Venue

Session 1: February 01-05, 2026/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

Session 2: August 02-06, 2026/Crowne Meeting Room, Crowne Plaza Al Khobar, KSA



Course Reference

IE0738



Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of field measurement devices. It covers the instrumentation and process control; the pressure, levels, temperatures and flows measurement; the process control and loops; the instrument symbols of PID; the various types of level measurement; the types of level measurement installed in the fertilizer plant; the ammonia production and urea production; and the urea reactor and stripper level measurement.



During this interactive course, participants will learn the magnetic float level measurement, float level measurement and displacer level measurement; the steam turbine condenser level measurement; the boiler and stream drum level measurement fundamental strategy; the significance of various types of level measurement of process control; optimizing strategy for boiler drum level control; new innovations and standards for the level measurements; the relevant international instruments standards for the level measurement; and troubleshooting and maintenance involve in each types of level measurement instrument.



Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain a comprehensive knowledge on field measurement devices
- Discuss instrumentation and process control including its definition, process measurements, process control and process characteristics and theoretical concepts of physical systems, electrical, liquid and thermal
- Identify pressure, levels, temperatures and flows covering control valve, evaluation and control
- Recognize process control and loops including block diagrams and process controller
- Interpret instrument symbols of PID including types of electrical, electronic and pneumatics equipment
- Identify the various types of level measurement covering the two methods used to measure level
- Discuss the purpose of level measurement, how level measurement transmitters work and the characteristics of level measurement elements
- Recognize the type of level measurement installed in the fertilizer plant
- Describe ammonia production and urea production
- Explain urea reactor and stripper level measurement that include level measurement bottom HP stripper and HP reactor
- Carryout theory and operations, control system involved and its philosophy, various aspects of maintenance, trouble shootings and problem solving
- Employ magnetic float level measurement, float level measurement and displacer level measurement
- Explain steam turbine condenser level measurement and its philosophy and instrument controls
- Carryout boiler and steam drum level measurement fundamental strategy
- Identify significance of various types of level measurement of process control
- Carryout ammonia storage level measurement (Enraf system) covering theory and operations, control system involved and its philosophy, various aspects of maintenance, troubleshooting and problem solving
- Discuss Honeywell Enraf SmartRadar flexline precision tank gauging system call 54 and Honeywell Enraf SmartRadar 970 series for storage tank measurements
- Optimize strategy for boiler drum level control and recognize control system involved for the level measurement
- Apply new innovations and standards for the level measurements
- Review the relevant international instruments standards for the level measurement

- Troubleshoot and maintain involve in each type of level measurement instrument
- Apply steam drum level measurement technique and discuss its theory and operations, control system involved and its philosophy, various aspects of maintenance, trouble shootings and problem solving
- Carryout level measurement challenges in boilers and steam drum case study as well as solve the seven most common tank gauging problems

Exclusive Smart Training Kit - H-STK®



*Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides a basic overview of all significant aspects and considerations of field measurement devices for instrument engineers, supervisors and technicians.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US\$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council for Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Attalla Ersan, PEng, MSc, BSc, is a **Senior Engineer** with over **30 years** of extensive experience within the **Oil & Gas, Hydrocarbon** and **Petrochemical** industries. His expertise widely covers the areas of **Power Transformers, Power System Analysis, Power Supply Substations, Electric Power System Operation, Fundamentals of Power System Equipment, Power System Stability, Power System Harmonics Analysis, Mitigation & Solution**

Strategies, Power System, Generation & Distribution, AC & DC Motors, Substations, Switchgears & Distribution, Electro-mechanical Protection Relays, Engineering Drawings, Industrial Power System Coordination, Distributed Control System (DCS), Honeywell TDS 3000 DCS, Liquid and Gas Flowmetering, Meter Calibration, Process Analyzer & Analytic Instrumentation, Process Control, Instrumentation, Troubleshooting & Problem Solving, Process Plant Operations, Process Plant Startup & Operating Procedure, Control Room Emergency Response, SIL Criteria, Calibration & Configuration of Installed Instrumentation, PLC & DCS, Bearing Replacement, Control Valves, Emergency Response Planning, Boiler & Steam System Management, Process Control Design & Plant Modelling, Process Instrumentation & Automation, Process Control Instrumentation, Analyzer Measurement Systems, Pressure Management and Selection & Sizing of all Instrumentation. Further, he is also well-versed in **Permit to Work System, Hazard and Operability (HAZOP) Study, Process Hazards Analysis (PHA), HAZOP Facilitation, Loss Prevention, Consequence Analysis Application, Gas Detectors Operation, Accident/Incident Investigation (Why Tree Method), Occupational Exposure Assessment, Fire Fighting & First Aid, Environmental Management and Basic Safety Awareness.** Project Management, Human Resources Consultancy, Manpower Planning, Job Design & Evaluation, Recruitment, Training & Development and Leadership, Creative Problem-Solving Skills, Work Ethic, Job Analysis Evaluation, Training & Development Needs, Bidding & Tendering, Technical Report Writing, Supervisory Leadership, Effective Communication Skills and Total Quality Management (TQM). He is currently the **CEO of Ersan Petrokimya Teknoloji Company Limited** wherein he is responsible for the design and operation of Biogas Process Plants.

During his career life, Mr. Ersan has gained his practical and field experience through his various significant positions and dedication as the **Policy, Organization & Manpower Development Head, Training & Development, Head, Ethylene Plant – Pyrolysis Furnace Engineer, Production Engineer, Process Training Coordinator, Ethylene Plant Shift Supervisor, Ethylene Plant Panel & Fit Operator, Process Training & Development Coordinator, Technical Consultant, and Instructor/Trainer** for Qatar Vinyl Company Limited and Qatar Petroleum Company (QAPCO).

Mr. Ersan is a **Registered Professional Engineer** and has a **Master's degree of Education in Educational Training & Leadership** and a **Bachelor's degree of Petrochemical Engineering.** Further, he is a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, workshops, conferences and seminars internationally.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	<i>Registration & Coffee</i>
0800 – 0815	<i>Welcome & Introduction</i>
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Instrumentation & Process Control <i>Definition • Process Measurements • Process Control & Process Characteristics • Theoretical Concepts of Physical Systems • Electrical, Liquid, Thermal</i>
0930 – 0945	<i>Break</i>
0945 – 1030	Overview of Pressure, Levels, Temperatures & Flows <i>Control Valves • Evaluation & Control • Examples of Drawings</i>
1030 – 1130	Process Control & loops <i>Definition • Block Diagrams • Process Controller</i>
1130 – 1245	<i>Break</i>
1245 – 1320	Understanding of PID <i>Instrument Symbols</i>
1320 – 1420	Electrical, Electronic & Pneumatics <i>Types of Equipment</i>
1420 – 1430	Recap
1430	<i>Lunch & End of Day One</i>

Day 2

0730 – 0830	Types of Level Measurement <i>Two Methods Used to Measure Level; Direct or Mechanical Method & Indirect or Inferential Methods • Definition • Gauge Glass Level Measurement • Electrical & Electronic Level Sensor • Remote Display Level Indicator • Level Engineering Units</i>
0830 – 0930	Types of Level Measurement (cont'd) <i>Dipsticks • Differential Pressure DP, Pressure-Measuring Devices (Hydrostatic Systems) • Buoyancy Buoyancy Tape Systems: Level Indicators Classified Based on Buoyancy • Ultrasonic Level Gauge • Radar (Microwave) Sensors • Capacitance Devices • Tank Gauging • Bypass Level Gauge</i>
0930 – 0945	<i>Break</i>
0945 – 1015	Purpose of Level Measurement <i>How Level Measurement Transmitters Work • Characteristics of Level Measurement Elements</i>
1015 - 1100	Ammonia Storage Level Measurement (Enraf System) <i>Theory & Operations, Control System Involved & its Philosophy, Various Aspects of Maintenance, Trouble Shootings & Problem Solving • Case Study (Honeywell Enraf SmartRadar Flexline Precision Tank Gauging System Call 54 & Honeywell Enraf SmartRadar 970 Series for Storage Tank Measurements</i>

1100 – 1230	Types of Level Measurement Installed in the Fertilizer Plant
1230 – 1245	Break
1245 – 1320	Ammonia Production Gas Scrubber Level • Ammonia Separator Level Measurement & Point Level Detection • Heat Recovery Boiler Level Measurement & Point Level Detection • Ammonia Tank Level Measurement & Point Level Detection
1320 – 1420	Urea Production Stripper Level Measurement • Pool Condenser Level Measurement • Urea Reactor Level Measurement & Point Level Detection
1420 – 1430	Recap
1430	Lunch & End of Day Two

Day 3

0730 – 0930	Reactor, Stripper Level & Separator Measurement (Level Measurement Bottom HP Stripper & HP Reactor) Theory & Operations, Control System Involved & its Philosophy, Various Aspects of Maintenance, Troubleshootings & Problem Solving • Case Study (Radar Level Measurements in Corrosion Sensitive Areas Stamicarbon and VEGA Radar Level Measurements in Corrosive Sensitive, Safurex VEGA Radar Instruments (Horn Type, Rod Type))
0930 – 0945	Break
0945 – 1100	Magnetic Float Level Measurement Magnetic Float Level Switch Working Animation • Magnetic Float Level Transmitter Working Principle Side Mounting Magnetostrictive Level Transmitter Working Principle • Magnetic Float Level Switch Installation Techniques
1100 – 1230	Float Level Measurement Float Switch Working Principle • Float Level Switch Working Principle Animation • Float Level Switch Working Principle
1230 – 1245	Break
1245 – 1420	Displacer Level Measurement Displacer Level Transmitter Dry Calibration with Weights • Displacer Level Switch Working Principle • Displacer (Buoyancy) Level Transmitter Principle, Limitations, Design • Installation & Calibration • Displacer Level Measurement Calculations • Displacer Level Transmitter Working Principle • Displacer Interface Level Measurement
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4

0730 – 0930	Steam Turbine Condenser Level Measurement & Its Philosophy & Instrument Controls
0930 – 0945	Break
0945 – 1100	Boiler & Steam Drum Level Measurement Fundamental Strategy Preventing Turbine Water Damage: Sources of Water Induction Boiler Drum's Water Level Control
1100 – 1230	Significance of Various Types of Level Measurement of Process Control

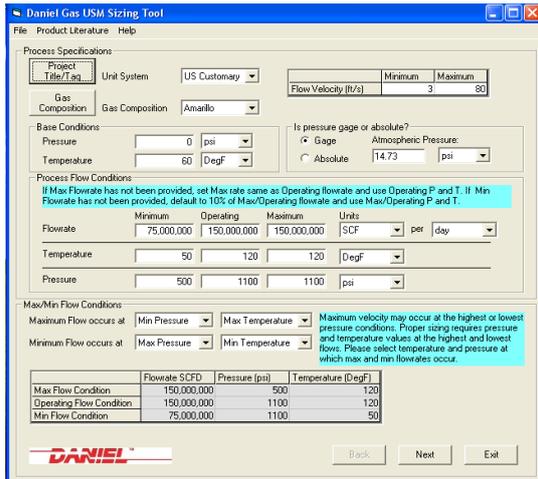
1230 - 1245	Break
1245 - 1420	Optimizing Strategy for Boiler Drum Level Control Shrink & Swell • Drum Level Measurement • Understanding Response Dynamics • Types of Level Control Systems • Tuning the Control Loop • Handling Disturbances
1420 - 1430	Recap
1430	Lunch & End of Day Four

Day 5

0730 - 0830	Control System Involved for the Level Measurement
0830 - 0930	New Innovations & Standards for the Level Measurements The Innovation in Interface Measurement
0930 - 0945	Break
0945 - 1230	The Relevant International Instruments Standards for the Level Measurement
1230 - 1245	Break
1245 - 1345	Troubleshooting & Maintenance Involve in each Type of Level Measurement Instrument Steam Drum Level Measurement Technique, Theory and Operations, Control System Involved & its Philosophy, Various Aspects of Maintenance, Trouble Shootings & Problem Solving • Case Study (Level Measurement Challenges in Boilers & Steam Drum) • Solving the Seven Most Common Tank Gauging Problems
1345 - 1400	Course Conclusion
1400 - 1415	POST-TEST
1415 - 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Simulators (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art “Gas Ultrasonic Meter Sizing Tool”, “Liquid Turbine Meter and Control Valve Sizing Tool”, “Liquid Ultrasonic Meter Sizing Tool” and “Orifice Flow Calculator” simulators.



Daniel Gas USM Sizing Tool

Process Specifications

Project Title/Tag: [] Unit System: US Customary

Gas Composition: Amairlo

Base Conditions: Pressure: 0 psi, Temperature: 60 DegF

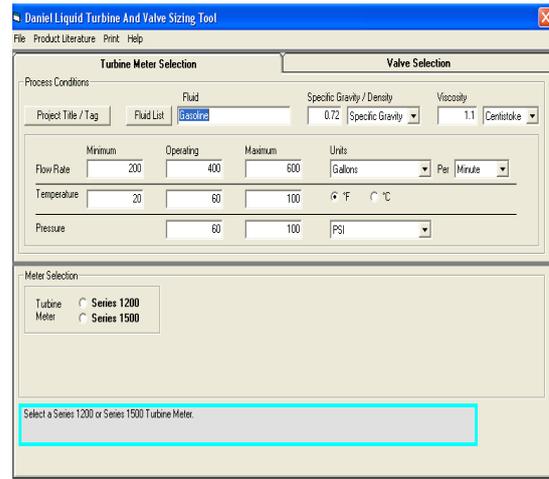
Process Flow Conditions:

Flowrate	Minimum	Operating	Maximum	Units
	75,000,000	150,000,000	150,000,000	SCF per day
Temperature	50	120	120	DegF
Pressure	500	1100	1100	psi

Max/Min Flow Conditions:

Flowrate SCFD	Pressure (psi)	Temperature (DegF)
Max Flow Condition	150,000,000	500
Operating Flow Condition	150,000,000	1100
Min Flow Condition	75,000,000	1100

Gas Ultrasonic Meter (USM) Sizing Tool Simulator



Daniel Liquid Turbine And Valve Sizing Tool

Process Conditions:

Fluid: Gasoline, Specific Gravity/Density: 0.72, Viscosity: 1.1 Centistoke

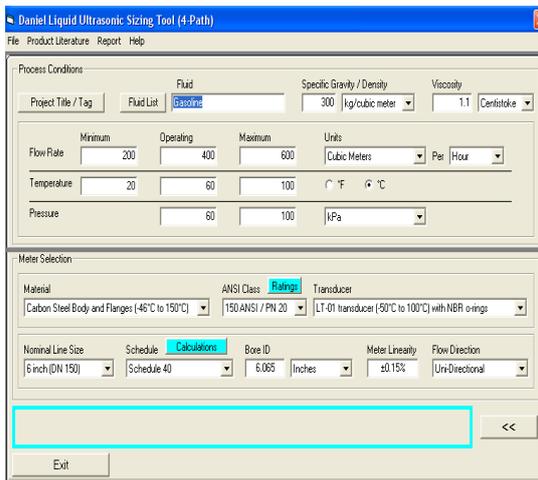
Flow Rate: 200, 400, 600 Gallons Per Minute

Temperature: 20, 60, 100 °F / °C

Pressure: 60, 100 PSI

Meter Selection: Turbine Series 1200, Meter Series 1500

Liquid Turbine Meter and Control Valve Sizing Tool Simulator



Daniel Liquid Ultrasonic Sizing Tool (4-Path)

Process Conditions:

Fluid: Gasoline, Specific Gravity/Density: 300 kg/cubic meter, Viscosity: 1.1 Centistoke

Flow Rate: 200, 400, 600 Cubic Meters Per Hour

Temperature: 20, 60, 100 °F / °C

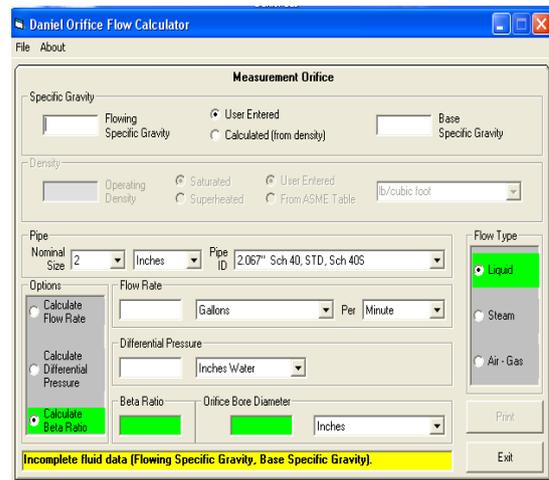
Pressure: 60, 100 kPa

Meter Selection:

Material: Carbon Steel Body and Flanges (46°C to 150°C)

Nominal Line Size: 6 inch (DN 150), Schedule: Schedule 40, Bore ID: 6.065 Inches, Meter Linearity: ±0.15%

Liquid Ultrasonic Meter Sizing Tool Simulator



Daniel Orifice Flow Calculator

Measurement Orifice

Specific Gravity: User Entered

Density: Operating Density: Saturated Superheated

Pipe: Nominal Size: 2 Inches, Pipe ID: 2.067" Sch 40, STD, Sch 40S

Flow Type: Liquid

Options: Calculate Flow Rate, Calculate Differential Pressure, Calculate Beta Ratio

Flow Rate: Gallons Per Minute

Differential Pressure: Inches Water

Beta Ratio: [] Orifice Bore Diameter: [] Inches

Incomplete fluid data (Flowing Specific Gravity, Base Specific Gravity)

Orifice Flow Calculator Simulator

Course Coordinator

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