



COURSE OVERVIEW IE0068 **Industrial Automation with MCC and VFD System**

Course Title

Industrial Automation with MCC and VFD System

Course Date/Venue

Session 1: April 20-24, 2026/Glasshouse
Meeting Room, Grand Millennium Al
Wahda Hotel, Abu Dhabi, UAE
Session 2: October 12-16, 2026/Glasshouse
Meeting Room, Grand Millennium Al
Wahda Hotel, Abu Dhabi, UAE



H-STK©
INCLUDED

Course Reference

IE0068

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Description



This practical and highly-interactive course includes real-life case studies 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 Industrial Automation with MCC and VFD Systems. It covers the basics of electrical power systems, power factor, energy efficiency, electrical safety fundamentals and earthing and grounding principles; the control system basics, industrial motors and detailed MCC design and layout; the MCC installation guidelines and procedures, testing, commissioning, routine and preventive maintenance practices and common troubleshooting techniques; and the types of starters in MCCs, protection devices in MCCs and communication and smart MCCs.



Further, the course will also discuss the VFD principles of operation, VFD components and design, VFD configuration and programming, VFD protection mechanisms and applications of VFD system; the writing and communication setup, protocols for MCC-VFD communication and synchronization of multiple drives; the role of PLCs in MCC and VFD integration; configuring HMIs for MCC and VFD control; and the real-time monitoring, data logging and alarm and fault management.

During this interactive course, participants will learn the energy-saving strategies with MCC and VFD, power quality issues and mitigation techniques; the electrical and mechanical safety measures, lockout/tagout procedures, risk assessment and emergency shutdown procedures; the advanced features of VFDs and process automation with MCC and VFD; the diagnostic tools for MCC and VFD, step-by-step troubleshooting methodology, and analyzing fault logs and system reports; modernizing existing MCC system and upgrading VFDs for higher performance; the energy efficiency retrofitting techniques and cost-benefit analysis of upgrades; and the industrial automation standards, environmental regulations, electrical codes and certifications and documentation and reporting requirements.

Course Objectives

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

- Apply and gain an in-depth knowledge on industrial automation with motor control center (MCC) and variable frequency drive (VFD) systems
- Discuss industrial automation, motor control center and variable frequency drive system
- Explain the basics of electrical power systems, power factor, energy efficiency, electrical safety fundamentals, and earthing and grounding principles
- Recognize control system basics, industrial motors and detailed MCC design and layout
- Employ MCC installation guidelines and procedures, testing, commissioning, routine and preventive maintenance practices, and common troubleshooting techniques
- Identify the types of starters in MCCs, protection devices in MCCs, and communication and smart MCCs
- Determine VFD principles of operation, VFD components and design, VFD configuration and programming, VFD protection mechanisms and applications of VFD system
- Apply writing and communication setup, protocols for MCC-VFD communication and synchronization of multiple drives
- Define the role of PLCs in MCC and VFD integration, configure HMIs for MCC and VFD control and apply real-time monitoring, data logging, and alarm and fault management
- Employ energy-saving strategies with MCC and VFD, identify power quality issues and mitigation techniques and apply electrical and mechanical safety measures, lockout/tagout procedures, risk assessment and emergency shutdown procedures
- Discuss the advanced features of VFDs covering multi-motor control, regenerative braking, dynamic braking resistors and custom programming options
- Carryout process automation with MCC and VFD, integration with SCADA/DCS systems and predictive maintenance systems
- Use diagnostic tools for MCC and VFD, apply step-by-step troubleshooting methodology and analyze fault logs and system reports

- Modernize existing MCC system, upgrade VFDs for higher performance and apply energy efficiency retrofitting techniques and cost-benefit analysis of upgrades
- Review industrial automation standards, environmental regulations, electrical codes and certifications, and documentation and reporting requirements

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 an overview of all significant aspects and considerations of industrial automation with MCC and VFD systems for engineers, electrical engineers, automation engineers, mechanical engineers, technicians and operators, maintenance technicians, plant operators, project managers, supervisors and team leads, consultants and system integrators and other technical staff.

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.

Accommodation

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

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.

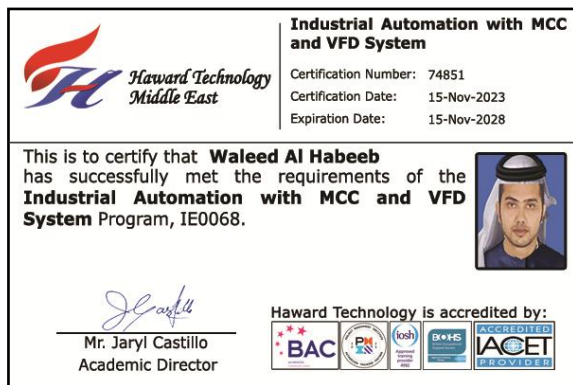
Course Certificate(s)

- (1) Internationally recognized Competency Certificates and Plastic Wallet Cards will be issued to participants who completed a minimum of 80% of the total tuition hours and successfully passed the exam at the end of the course. Certificates are valid for 5 years.

Recertification is FOC for a Lifetime.

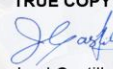
Sample of Certificates

The following are samples of the certificates that will be awarded to course participants:-





- (2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.

* Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology *				
		Haward Technology Middle East Continuing Professional Development (HTME-CPD)		
CEU Official Transcript of Records				
TOR Issuance Date:		15-Nov-23		
HTME No.		74851		
Participant Name:		Waleed Al Habeeb		
Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
IE0068	Industrial Automation with MCC and VFD System	November 11-15, 2023	30	3.0
Total No. of CEU's Earned as of TOR Issuance Date				3.0
TRUE COPY  Jaryl Castillo Academic Director				
Haward Technology has been approved as an Accredited Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2018 Standard which is widely recognized as the standard of good practice internationally. As a result of their Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for programs that qualify under the ANSI/IACET 1-2018 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 Association 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 is accredited by 				
P.O. Box 26070, Abu Dhabi, United Arab Emirates Tel.: +971 2 3091 714 E-mail: info@haward.org Website: www.haward.org				
* Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology *				

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -



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

- 

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. Sydney Thoresson, PE, BSc, is a **Senior Electrical & Instrumentation Engineer** with over **30 years** of extensive experience within the **Petrochemical, Utilities, Oil, Gas and Power** industries. His specialization highly evolves in **Process Control Instrumentation, Process Instrumentation & Control, Process Control, Instrumentation, Troubleshooting & Problem Solving, Instrumentation Engineering, Process Control (PCI) & Safeguarding, Instrument Calibration & Maintenance, Instrumented Safety Systems, High Integrity Protection Systems (HIPS), Process Controller, Control Loop & Valve Tuning, Compressor Control & Protection, Control Systems, Programmable Logic Controllers (PLC), SCADA System, PLC & SCADA - Automation & Process Control, PLC & SCADA Systems Application, Technical DCS/SCADA, PLC-SIMATIC S7 300/400: Configuration, Programming and Troubleshooting, PLC, Telemetry and SCADA Technologies, Cyber Security of Industrial Control System (PLC, DCS, SCADA & IED), Basics of Instrumentation Control System, DCS, Distributed Control System - Operations & Techniques, Distributed Control System (DCS) Principles, Applications, Selection & Troubleshooting, Distributed Control Systems (DCS) especially in Honeywell DCS, H&B DCS, Modicon, Siemens, Telemecanique, Wonderware and Adrioit, Safety Instrumented Systems (SIS), Safety Integrity Level (SIL), Emergency Shutdown (ESD), Emergency Shutdown System, Variable Frequency Drive (VFD), Process Control & Safeguarding, Field Instrumentation, Instrumented Protective Devices Maintenance & Testing, Instrumented Protective Function (IPF), Refining & Rotating Equipment, Equipment Operations, Short Circuit Calculation, Voltage Drop Calculation, Lighting Calculation, Hazardous Area Classification, Intrinsic Safety, Liquid & Gas Flowmetering, Custody Measurement, Ultrasonic Flowmetering, Loss Control, Gas Measurement, Flowmetering & Custody Measurement, Multiphase Flowmetering, Measurement and Control, Mass Measuring System Batching (Philips), Arc Furnace Automation-Ferro Alloys, Walking Beam Furnace, Blast Furnace, Billet Casting Station, Cement Kiln Automation, Factory Automation and Quality Assurance Accreditation (ISO 9000 and Standard BS 5750). Further, he is also well-versed in **Electrical Safety, Electrical Hazards Assessment, Electrical Equipment, Personal Protective Equipment, Log-Out & Tag-Out (LOTO), ALARP & LOPA Methods, Confined Workspaces, Power Quality, Power Network, Power Distribution, Distribution Systems, Power Systems Control, Power Systems Security, Power Electronics, Electrical Substations, UPS & Battery System, Earthing & Grounding, Power Generation, Protective Systems, Electrical Generators, Power & Distribution Transformers, Electrical Motors, Switchgears, Transformers, AC & DC Drives, Variable Speed Drives & Generators and Generator Protection**. He is currently the **Projects Manager** wherein he manages projects in the field of electrical and automation engineering and in-charge of various process hazard analysis, fault task analysis, FMEA and HAZOP study.**

During Mr. Thoresson's career life, he has gained his thorough and practical experience through various challenging positions and dedication as the **Contracts & Projects Manager, Managing Director, Technical Director, Divisional Manager, Plant Automation Engineer, Senior Consulting Engineer, Senior Systems Engineer, Consulting Engineer, Service Engineer and Section Leader** from several international companies such as **Philips, FEDMIS, AEG, DAVY International, BOSCH, Billiton and Endress/Hausser**.

Mr. Thoresson is a **Registered Professional Engineering Technologist** and has a **Bachelor's degree in Electrical & Electronics Engineering** and a **National Diploma in Radio Engineering**. Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)** and an active member of the **International Society of Automation (ISA)** and the **Society for Automation, Instrumentation, Measurement and Control (SAIMC)**. He has further delivered numerous trainings, courses, seminars, conferences and workshops worldwide.

Course Program

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

Day 1

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Industrial Automation Definition & Importance • Components of Automation Systems • Key Industrial Automation Applications • Trends & Future Prospects in Automation
0930 – 0945	Break
0945 – 1030	Overview of MCC (Motor Control Center) What is an MCC? • Types of MCCs (Conventional & Intelligent) • Basic Components of MCC (Switchgear, Breakers, Relays, etc.) • Standards & Classifications (IEC, NEMA)
1030 – 1130	Basics of VFD (Variable Frequency Drive) Systems What is a VFD? • Importance of VFDs in Automation • Basic Working Principles • Benefits of VFD Systems
1130 – 1215	Electrical Fundamentals for MCC & VFD Systems Basics of Electrical Power Systems (Single-Phase versus Three-Phase) • Power Factor & Energy Efficiency • Electrical Safety Fundamentals • Earthing & Grounding Principles
1215 – 1230	Break
1230 – 1330	Control Systems Basics Open-loop versus Closed-Loop Control • Overview of PLCs & HMIs in Automation • Sensors & Actuators in Control Systems • Communication Protocols in Automation (e.g., Modbus, Profibus)
1330 – 1420	Understanding Industrial Motors Types of Motors Used in Automation (AC, DC, Stepper, Servo) • Motor Control Principles • Motor Ratings & Specifications • Motor Starting Methods & Protection
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One

Day 2

0730 – 0830	Detailed MCC Design & Layout Components of MCC Design • Busbar Configuration & Types • Power Distribution Inside MCC • MCC Panel Arrangement & Labeling
0830 – 0930	MCC Installation & Maintenance Installation Guidelines & Procedures • Testing & Commissioning MCCs • Routine & Preventive Maintenance Practices • Common Troubleshooting Techniques
0930 – 0945	Break

0945 – 1100	Types of Starters in MCCs Direct-On-Line (DOL) Starter • Star-Delta Starter • Soft Starters • Applications & Differences Among Starters
1100 – 1215	Protection Devices in MCC Overload Relays & Circuit Breakers • Short-Circuit Protection Devices • Thermal Protection & Fuses • Coordination of Protection Devices
1215 – 1230	Break
1230 – 1330	Communication & Smart MCCs Intelligent MCCs (iMCCs) Overview • Integration of MCC with SCADA & DCS Systems • Use of Smart Devices in MCC • Data Monitoring & Diagnostics in iMCCs
1330 – 1420	Practical Exercises Identifying MCC Components • Reading MCC Wiring Diagrams • Hands-on Assembly of a Basic MCC Panel • Simulated Troubleshooting Exercises
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Two

Day 3

0730 – 0830	VFD Principles of Operation Working Principle of VFDs • Pulse Width Modulation (PWM) in VFDs • Frequency & Voltage Control • VFD Efficiency & Energy Savings
0830 – 0930	VFD Components & Design Rectifier & Inverter Units • Filters & Capacitors • Cooling Systems in VFDs • User Interfaces & Displays
0930 – 0945	Break
0945 – 1100	VFD Configuration & Programming Understanding VFD Parameters • Setting up Acceleration & Deceleration Times • Torque & Speed Control Settings • Integration with External Controls (PLCs, HMIs)
1100 – 1215	VFD Protection Mechanisms Overcurrent & Overvoltage Protection • Thermal Overload & Ground Fault Protection • Common Fault Codes & Remedies • Maintenance Practices for VFD Systems
1215 – 1230	Break
1230 – 1330	Applications of VFD Systems Pump & Fan Control • Conveyor Belt Systems • HVAC Applications • Specialized Applications (e.g., Cranes, Lifts)
1330 – 1420	Hands-on VFD Exercise Connecting a Motor to a VFD • Parameter Setup for Specific Applications • Troubleshooting Common VFD Issues • Live Demonstration of Energy Savings
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Three

Day 4

0730 – 0830	Interfacing MCC & VFD Systems <i>Wiring & Communication Setup • Protocols for MCC-VFD Communication • Synchronization of Multiple Drives • Case Studies of MCC-VFD Integration</i>
0830 – 0930	Automation Control with MCC & VFD <i>Role of PLCs in MCC & VFD Integration • Configuring HMIs for MCC & VFD Control • Real-time Monitoring & Data Logging • Alarm & Fault Management</i>
0930 – 0945	Break
0945 – 1100	Energy Efficiency & Power Quality <i>Energy-Saving Strategies with MCC & VFD • Power Quality Issues & Mitigation Techniques • Harmonics in VFD Systems • Role of Filters & Reactors</i>
1100 – 1215	Safety in MCC & VFD Operations <i>Electrical & Mechanical Safety Measures • Lockout/Tagout Procedures • Risk Assessment for MCC & VFD Systems • Emergency Shutdown Procedures</i>
1215 – 1230	Break
1230 – 1330	Advanced Features of VFDs <i>Multi-Motor Control • Regenerative Braking • Dynamic Braking Resistors • Custom Programming Options</i>
1330 – 1420	Practical Case Study <i>Simulated Industrial Scenario • Designing an Integrated MCC-VFD System • Configuring Parameters for Specific Applications • Testing the Integrated System</i>
1420 – 1430	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow</i>
1430	Lunch & End of Day Four

Day 5

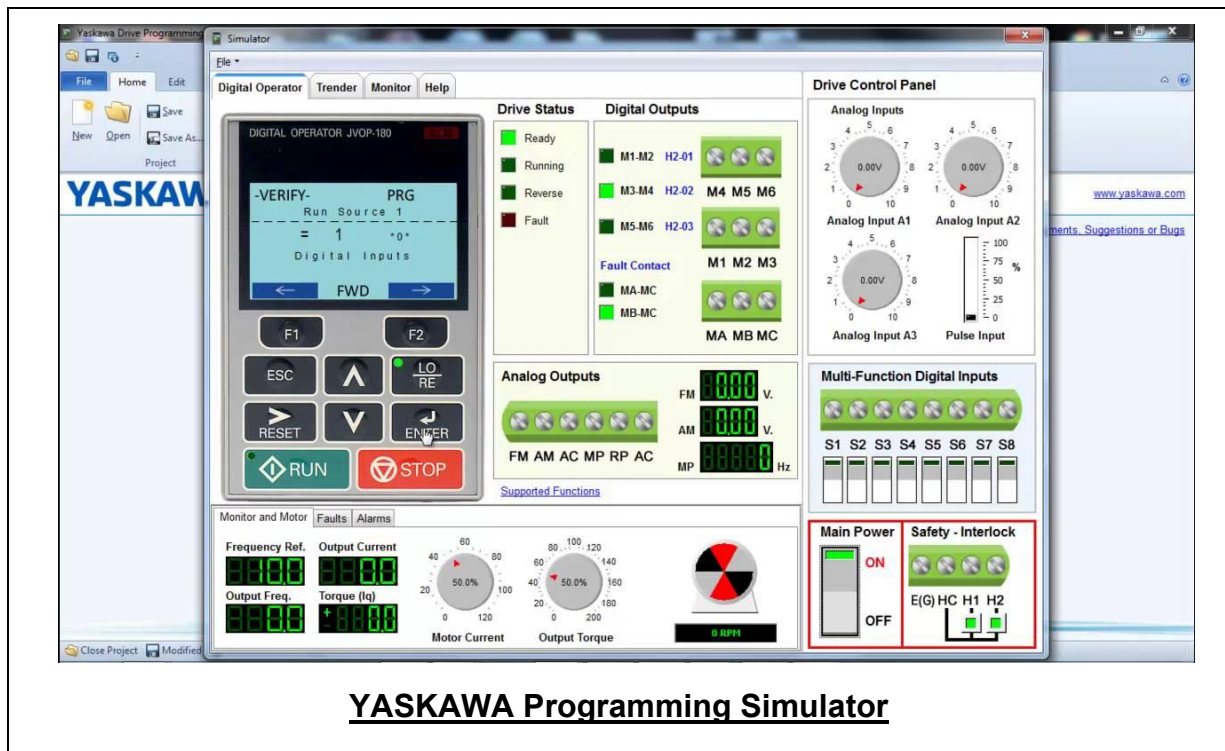
0730 – 0830	Advanced Industrial Applications <i>Process Automation with MCC & VFD • Integration with SCADA/DCS Systems • Predictive Maintenance Systems • IIoT Applications in MCC & VFD Systems</i>
0830 – 0930	Diagnostics & Troubleshooting <i>Using Diagnostic Tools for MCC & VFD • Step-by-Step Troubleshooting Methodology • Analyzing Fault Logs & System Reports • Real-World Problem-Solving Scenarios</i>
0930 – 0945	Break
0945 – 1100	Retrofitting & Upgrading Systems <i>Modernizing Existing MCC Systems • Upgrading VFDs for Higher Performance • Energy Efficiency Retrofitting Techniques • Cost-Benefit Analysis of Upgrades</i>
1100 – 1200	Compliance & Standards <i>Industrial Automation Standards (IEC, IEEE, NEMA) • Environmental Regulations (EMI/EMC Compliance) • Electrical Codes & Certifications •</i>



	Documentation & Reporting Requirements
1200 – 1215	Break
1215 – 1300	Capstone Project Design & Implement a Real-World Automation System • MCC & VFD Integration for a Specific Application • Presentation & Demonstration of the Project • Feedback & Evaluation
1300 – 1315	Course Conclusion
1315 – 1415	COMPETENCY EXAM
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 “Yaskawa Programming Simulator”.





Allen Bradley SLC 500 Simulator



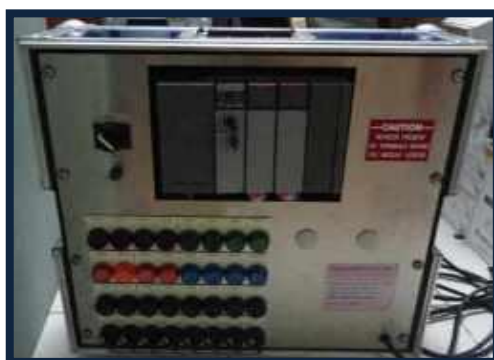
Siemens S7-200 Simulator



Allen Bradley Micrologix 1000
Simulator (Digital)



Allen Bradley Micrologix 1000
Simulator (Analog)



Allen Bradley SLC 5/03



Allen Bradley WS5610 PLC
Simulator PLC5



The screenshot shows the 'Daniel Gas USM Sizing Tool' interface. It includes sections for 'Process Specifications' (Unit System, Gas Composition, Flow Velocity), 'Base Conditions' (Pressure, Temperature), 'Process Flow Conditions' (Flowrate, Temperature, Pressure), and 'Max/Min Flow Conditions'. A table at the bottom summarizes the flow conditions.

	Flowrate SCFD	Pressure (psi)	Temperature (DegF)
Max Flow Condition	150,000,000	500	120
Operating Flow Condition	150,000,000	1100	120
Min Flow Condition	75,000,000	1100	50

Gas Ultrasonic Meter (USM) Sizing Tool Software

The screenshot shows the 'Daniel Liquid Turbine And Valve Sizing Tool' interface. It includes sections for 'Turbine Meter Selection' and 'Valve Selection'. The 'Process Conditions' section includes Project Title / Tag, Fluid List, Specific Gravity / Density, and Viscosity. The 'Meter Selection' section includes Turbine and Series 1200/1500 options.

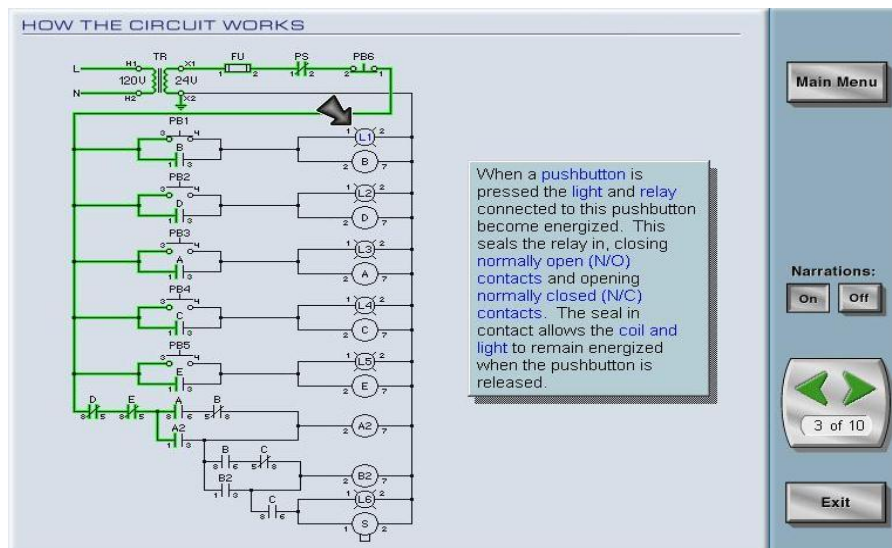
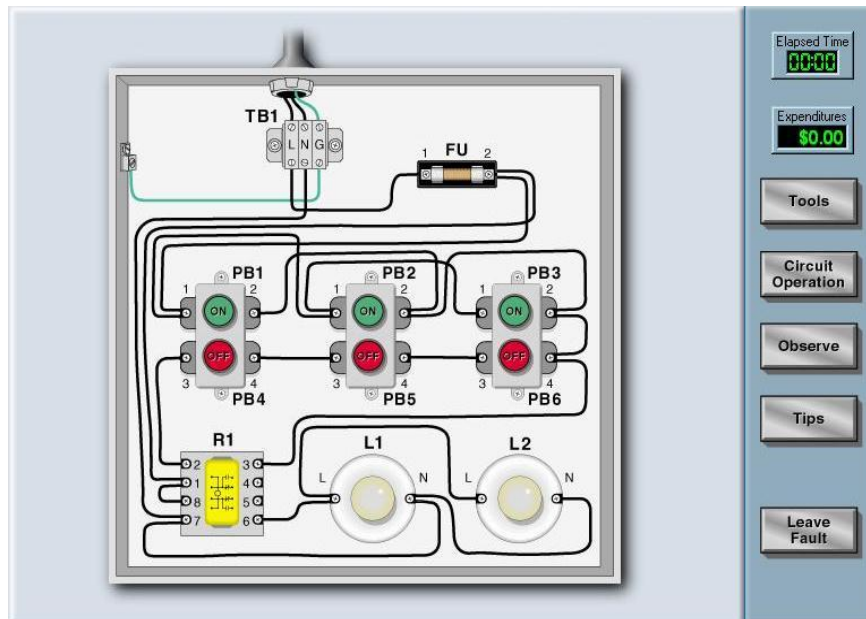
Liquid Turbine Meter and Control Valve Sizing Tool Software

The screenshot shows the 'Daniel Liquid Ultrasonic Sizing Tool (4-Path)' interface. It includes sections for 'Process Conditions' (Fluid, Specific Gravity / Density, Viscosity, Flow Rate, Temperature, Pressure) and 'Meter Selection' (Material, ANSI Class, Transducer, Nominal Line Size, Schedule, Bore ID, Meter Linearity, Flow Direction).

Liquid Ultrasonic Meter Sizing Tool Software

The screenshot shows the 'Daniel Orifice Flow Calculator' interface. It includes sections for 'Measurement Orifice' (Specific Gravity, Density, Pipe, Options) and 'Flow Type' (Liquid, Steam, Air - Gas). A yellow warning bar at the bottom indicates 'Incomplete fluid data (Flowing Specific Gravity, Base Specific Gravity)'.

Orifice Flow Calculator Software





Simutech Troubleshooting Electrical Circuits V4.1



Lab Volt Testing Device

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org