COURSE OVERVIEW ME1241
Enhance Energy Efficiency in Heating, Ventilation and Air Conditioning (HVAC) Systems

Course Title
Enhance Energy Efficiency in Heating, Ventilation and Air Conditioning (HVAC) Systems

Course Date/Venue
August 10-14, 2026/Online Virtual Training

Course Reference
ME1241

Course Duration/Credits
Five days/2.75 CEUs/27.5 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 Enhance Energy Efficiency in Heating, Ventilation and Air Conditioning (HVAC) Systems. It covers the HVAC systems and energy management, HVAC energy dynamics and heat transfer; the HVAC equipment performance and efficiency, HVAC loads, energy demand analysis and energy efficiency fundamentals; the HVAC standards, regulations, best practices and HVAC energy auditing; the energy losses, HVAC system performance measurement and advanced HVAC control strategies; the smart HVAC technologies and energy consumption reduction techniques; and the high-efficiency HVAC equipment.

During this interactive course, participants will learn the efficient air distribution systems, renewable energy applications in HVAC and thermal energy storage systems; the indoor environmental quality and energy optimization; the HVAC retrofit, system upgrades and HVAC monitoring technologies; the data collection, performance analysis, fault detection, diagnostics (FDD) and predictive and condition-based maintenance; the HVAC troubleshooting for energy efficiency, best practices in preventive maintenance and HVAC system optimization; the regulatory compliance and energy standards; the sustainability green building integration and economic evaluation of energy efficiency projects; and developing HVAC energy improvement plans.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain a good working knowledge on enhancing energy efficiency in heating, ventilation and air conditioning (HVAC) systems
- Discuss HVAC systems and energy management including HVAC energy dynamics and heat transfer
- Recognize HVAC equipment performance and efficiency, HVAC loads and energy demand analysis as well as energy efficiency fundamentals
- Apply HVAC standards, regulations and best practices and HVAC energy auditing
- Identify energy losses and employ HVAC system performance measurement and advanced HVAC control strategies
- Discuss smart HVAC technologies, energy consumption reduction techniques and high-efficiency HVAC equipment
- Recognize efficient air distribution systems, renewable energy applications in HVAC and thermal energy storage systems
- Carryout indoor environmental quality and energy optimization, HVAC retrofit and system upgrades including HVAC monitoring technologies
- Employ data collection and performance analysis, fault detection and diagnostics (FDD) and predictive and condition-based maintenance
- Implement HVAC troubleshooting for energy efficiency, best practices in preventive maintenance and HVAC system optimization
- Discuss regulatory compliance and energy standards and apply sustainability and green building integration, economic evaluation of energy efficiency projects and developing HVAC energy improvement plans

Who Should Attend

This course provides an overview of all significant aspects and considerations of enhance energy efficiency in heating, ventilation and air conditioning (HVAC) systems for VAC engineers and technicians, facility and building maintenance engineers, energy managers and sustainability professionals, mechanical engineers involved in building services, operations and maintenance personnel, commissioning and testing engineers, MEP (mechanical, electrical, plumbing) professionals, plant and utilities maintenance staff, HSE and environmental efficiency officers, professionals responsible for optimizing HVAC system performance and reducing energy consumption

Course Fee

US$ 2,750 per Delegate + **VAT**.

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

Haward's 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**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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 **2.75 CEUs** (Continuing Education Units) or **27.5 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. Karl Thanasis, PEng, MSc, MBA, BSc, is **Senior Mechanical & Maintenance Engineer** with over **30 years** of extensive industrial experience. His wide expertise includes **District Cooling** Design, Operation & Maintenance HVAC System, **HVAC** Equipment Terminology, **HVAC System Block Load Calculation**, **HVAC System** Development of Drawings, **Air Distribution** System, **Hydraulic & Pneumatic Systems** Maintenance, **Piping & Pipeline**, Maintenance, Repair, **Shutdown**, **Turnaround & Outages**, **Maintenance & Reliability** Management, **Mechanical Maintenance** Planning, Scheduling & Work Control, Advanced Techniques in **Maintenance** Management, **Predictive & Preventive** Maintenance, **Maintenance & Operation Cost Reduction** Techniques, Reliability Centered Maintenance (**RCM**), **Machinery Failure** Analysis, **Rotating Equipment Reliability** Optimization & Continuous Improvement, **Material Cataloguing**, **Mechanical & Rotating Equipment** Troubleshooting & Maintenance, **Root Cause Analysis & Reliability** Improvement, **Condition** Monitoring, **Root Cause Failure Analysis** (RCFA), **Steam Generation**, **Steam Turbines**, **Power Generator Plants**, **Gas Turbines**, **Combined Cycle Plants**, **Boilers**, **Process Fired Heaters**, Air Preheaters, Induced Draft Fans, All Heaters Piping Work, Refractory Casting, Heater Fabrication, Thermal & Fired Heater Design, **Heat Exchangers**, Heat Transfer, Coolers, **Power Plant** Performance, Efficiency & Optimization, **Storage Tank** Design & Fabrication, **Thermal Power Plant** Management, **Boiler & Steam** System Management, **Pump** Operation & Maintenance, **Chiller & Chiller Plant** Design & Installation, **Pressure Vessel**, **Safety Relief Valve** Sizing & Selection, **Valve** Disassembling & Repair, Pressure Relief Devices (**PSV**), **Hydraulic & Pneumatic** Maintenance, Advanced **Valve** Technology, **Pressure Vessel** Design & Fabrication, **Pumps**, Turbo-Generator, Turbine **Shaft Alignment**, **Lubrication**, Mechanical **Seals**, Packing, **Blowers**, **Bearing** Installation, **Couplings**, **Clutches** and **Gears**. Further, he is also versed in **Wastewater Treatment** Technology, **Networking** System, **Water Network Design**, Industrial **Water Treatment** in Refineries & Petrochemical Plants, **Piping** System, Water Movement, Water Filtering, Mud Pumping, **Sludge Treatment** and **Drying**, **Aerobic Process** of **Water Treatment** that includes **Aeration**, **Sedimentation** and **Chlorination Tanks**. His strong background also includes **Design** and **Sizing** of all **Waste Water Treatment Plant Associated Equipment** such as **Sludge Pumps**, **Filters**, **Metering Pumps**, **Aerators** and **Sludge Decanters**.

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager**, **Plant Manager**, **Area Manager - Equipment Construction**, **Construction Superintendent**, **Project Engineer** and **Design Engineer**. His duties covered **Plant Preliminary Design**, **Plant Operation**, **Write-up** of **Capital Proposal**, **Investment Approval**, **Bid Evaluation**, **Technical Contract Write-up**, **Construction** and **Sub-contractor Follow up**, **Lab Analysis**, **Sludge Drying** and **Management** of **Sludge Odor** and **Removal**. He has worked in various companies worldwide in the **USA**, **Germany**, **England** and **Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA** and **Greece** and has a **Master's** and **Bachelor's** degree in **Mechanical Engineering** with **Honours** from the **Purdue University** and **SIU** in **USA** respectively as well as an **MBA** from the **University of Phoenix** in **USA**. Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management** (**ILM**) a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, seminars, workshops and conferences worldwide.

Virtual Training (If Applicable)

If this course is delivered online as a Virtual Training, the following limitations will be applicable:-

Certificates	Only soft copy certificates will be issued to participants through Haward's Portal. This includes Wallet Card Certificates if applicable
Training Materials	Only soft copy Training Materials (PDF format) will be issued to participant through the Virtual Training Platform
Training Methodology	80% of the program will be theory and 20% will be practical sessions, exercises, case studies, simulators or videos
Training Program	The training will be for 6 hours per day starting at 0800 and ending at 1400
H-STK Smart Training Kit	Not Applicable
Hands-on Practical Workshops	Not Applicable
Site Visit	Not Applicable
Simulators	Only software simulators will be used in the virtual courses. Hardware simulators are not applicable and will not be used in Virtual Training

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.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

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: ***Monday, 10th of August 2026***

0800 – 0830	*Registration &Coffee*
0830 – 0845	*Welcome & Introduction*
0845 – 0900	***PRE-TEST***
0900 – 0930	***Introduction to HVAC Systems & Energy Management*** *Overview of HVAC System Types and Applications • Major HVAC Components and Their Functions • HVAC System Operating Principles • Role of HVAC in Building Energy Consumption*
0930 – 0945	*Break*
0945 – 1030	***HVAC Energy Dynamics & Heat Transfer*** *Principles of Heat Transfer in HVAC Systems • Sensible and Latent Heat Concepts • Airflow Dynamics and Ventilation Fundamentals • Energy Balance Within HVAC Systems*
1030 – 1100	***HVAC Equipment Performance & Efficiency*** *Chillers, Boilers, Heat Pumps and Rooftop Units • Air Handling Units (AHUs) and Fan Coil Units (FCUs) • Cooling Towers and Condenser Systems • Equipment Efficiency Ratings (COP, EER, SEER, IPLV)*
1100 – 1200	***HVAC Loads & Energy Demand Analysis*** *Building Cooling and Heating Load Calculations • Internal and External Heat Gains • Occupancy and Weather Impacts on HVAC Demand • Peak Demand Management Strategies*
1200 – 1215	*Break*
1215 – 1300	***Energy Efficiency Fundamentals*** *Definition of HVAC Energy Efficiency • Factors Affecting HVAC Energy Performance • Common Causes of Excessive Energy Consumption • Energy Conservation Opportunities*
1300 – 1350	***HVAC Standards, Regulations & Best Practices*** *International HVAC Energy Standards • ASHRAE Energy Efficiency Guidelines • ISO 50001 Energy Management Principles • Building Energy Codes and Sustainability Requirements*
1350 – 1400	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1400	*End of Day One*

Day 2: ***Tuesday, 11th of August 2026***

0800 – 0900	***HVAC Energy Auditing*** *Energy Audit Methodologies • Establishing Energy Baselines • Utility Bill Analysis • Benchmarking HVAC Performance*
0900 – 0930	***Identifying Energy Losses*** *Air Leakage and Duct System Losses • Refrigerant Inefficiencies • Thermal Insulation Deficiencies • Equipment Degradation Impacts*
0930 – 0945	*Break*
0945 – 1100	***HVAC System Performance Measurement*** *Key Performance Indicators (KPIs) • System Efficiency Calculations • Energy Performance Benchmarking • Identifying Operational Inefficiencies*

1100 – 1200	***Advanced HVAC Control Strategies*** *Demand-Controlled Ventilation (DCV) • Variable Air Volume (VAV) Optimization • Variable Frequency Drives (VFDs) • Optimum Start and Stop Scheduling*
1200 - 1215	*Break*
1215 – 1300	***Smart HVAC Technologies*** *Building Management Systems (BMS) • Building Automation Systems (BAS) • Smart Thermostats and Intelligent Controllers • Internet of Things (IoT) Applications*
1300 – 1350	***Energy Consumption Reduction Techniques*** *Equipment Scheduling Optimization • Occupancy-Based Control Strategies • Temperature and Humidity Optimization • Reducing Standby Energy Consumption*
1350 – 1400	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1400	*End of Day Two*

Day 3: Wednesday, 12th of August 2026

0800 – 0900	***High-Efficiency HVAC Equipment*** *High-Efficiency Chillers and Heat Pumps • Energy-Efficient Compressors • Premium-Efficiency Motors • Advanced Fan Technologies*
0900 – 0930	***Efficient Air Distribution Systems*** *Duct Design Optimization • Air Balancing Techniques • Static Pressure Optimization • Fan Energy Reduction Methods*
0930 – 0945	*Break*
0945 – 1100	***Renewable Energy Applications in HVAC*** *Solar-Assisted HVAC Systems • Geothermal Heat Pump Systems • Biomass Heating Integration • Hybrid Renewable HVAC Solutions*
1100 – 1200	***Thermal Energy Storage Systems*** *Chilled Water Storage • Ice Storage Technologies • Load Shifting Strategies • Peak Demand Reduction*
1200 - 1215	*Break*
1215 – 1300	***Indoor Environmental Quality & Energy Optimization*** *Indoor Air Quality (IAQ) Management • Ventilation Optimization • Humidity Control Techniques • Balancing Occupant Comfort with Energy Efficiency*
1300 – 1350	***HVAC Retrofit & System Upgrades*** *Identifying Retrofit Opportunities • Equipment Replacement Strategies • Cost-Benefit Evaluation • Return on Investment (ROI) Analysis*
1350 – 1400	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
13301400	*End of Day Three*

Day 4: Thursday, 13th of August 2026

0800 – 0900	***HVAC Monitoring Technologies*** *Energy Monitoring Systems • Smart Sensors and Instrumentation • Wireless Monitoring Solutions • Real-Time Performance Tracking*
0900 – 0930	***Data Collection & Performance Analysis*** *HVAC Operational Data Acquisition • Trend Analysis Techniques • Energy Dashboards • Performance Reporting*

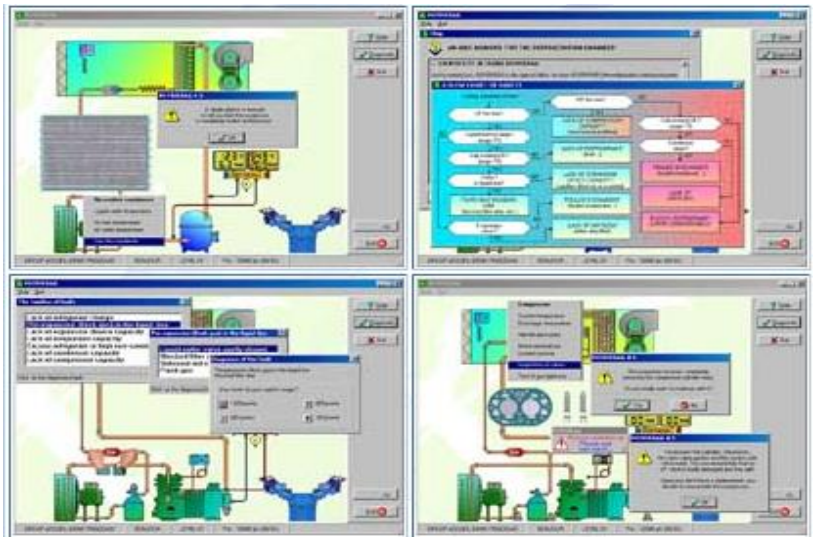
0930 – 0945	Break
0945 – 1100	***Fault Detection & Diagnostics (FDD)*** *Automated Fault Detection Systems • Identifying Hidden System Faults • Root Cause Analysis • Corrective Action Planning*
1100 – 1200	***Predictive & Condition-Based Maintenance*** *Predictive Maintenance Principles • Condition Monitoring Techniques • Equipment Health Assessment • Maintenance Scheduling Optimization*
1200 - 1215	Break
1215 – 1300	***HVAC Troubleshooting for Energy Efficiency*** *Airflow and Pressure Problems • Refrigeration Cycle Faults • Electrical and Control System Issues • Mechanical Equipment Failures*
1300 – 1350	***Best Practices in Preventive Maintenance*** *Maintenance Planning and Documentation • Filter, Coil, and Heat Exchanger Maintenance • Refrigerant Management • Calibration of Sensors and Controls*
1350 – 1400	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1400	*End of Day Four*

Day 5: Friday, 14th of August 2026

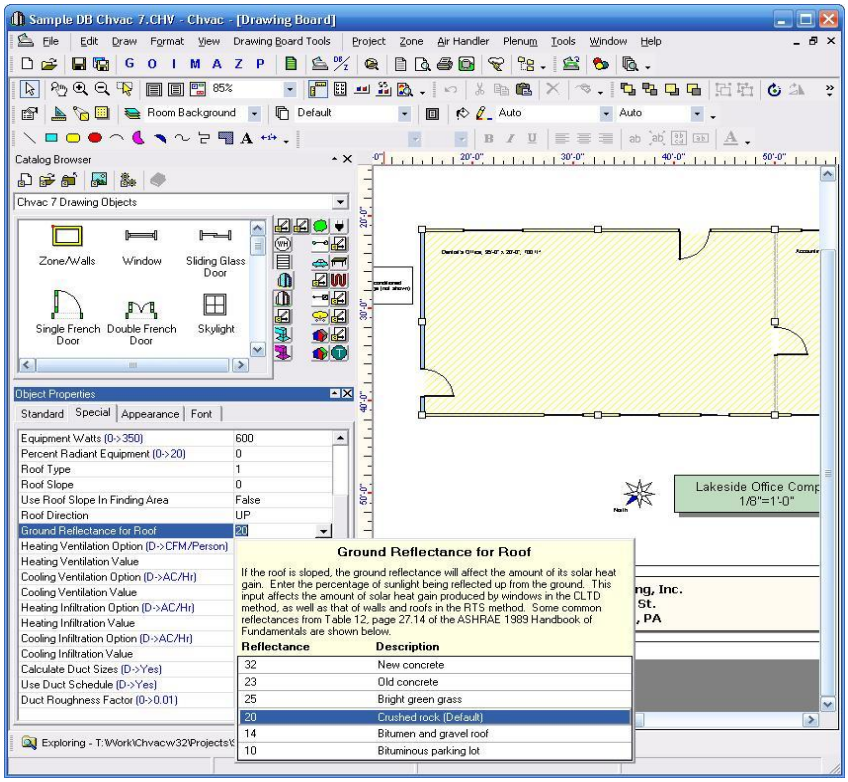
0800 – 0900	***HVAC System Optimization*** *Continuous Commissioning • Recommissioning Existing HVAC Systems • Performance Optimization Methodologies • Lifecycle Energy Management*
0900 – 0930	***Regulatory Compliance & Energy Standards*** *ASHRAE Standards 90.1 and 62.1 • ISO 50001 Implementation • Local Building Energy Regulations • Environmental Compliance Requirements*
0930 – 0945	Break
0945 – 1100	***Sustainability & Green Building Integration*** *LEED Requirements for HVAC Systems • Green Building Certification Programs • Carbon Footprint Reduction Strategies • Net Zero Energy Buildings (NZEB)*
1100 – 1200	***Economic Evaluation of Energy Efficiency Projects*** *Life Cycle Cost Analysis (LCCA) • Payback Period Calculations • Net Present Value (NPV) Evaluation • Energy Project Financing Options*
1200 - 1215	Break
1215 - 1300	***Developing HVAC Energy Improvement Plans*** *Identifying Improvement Opportunities • Prioritizing Energy-Saving Initiatives • Developing Implementation Roadmaps • Measuring Improvement Outcomes*
1300 – 1330	***Practical Case Studies*** *Real-world HVAC Energy Optimization Case Studies • Analysis of Successful Retrofit Projects • Group Workshop on HVAC Improvement Planning*
1330 - 1345	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1345 - 1400	***POST-TEST***
1400	*End of Course*

Simulators (Hands-on Practical Sessions)

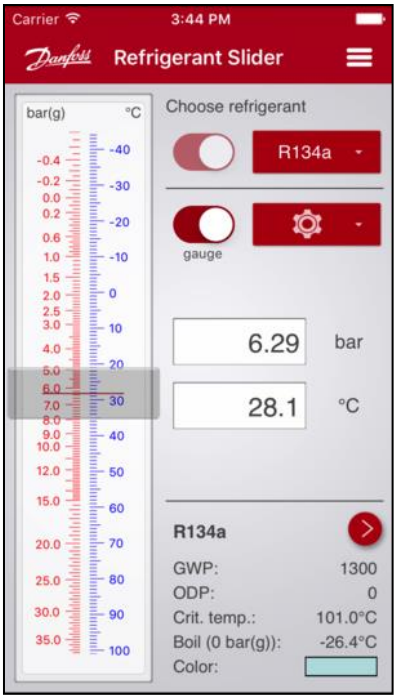
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using one of our state-of-the-art simulators "Elite CHVAC Simulator", "KOTZA HVAC Simulator", "Danfoss Refrigerant Slider App", "Danfoss Trouble Shooter App" and "Air Lite Psychrometric Calcs".



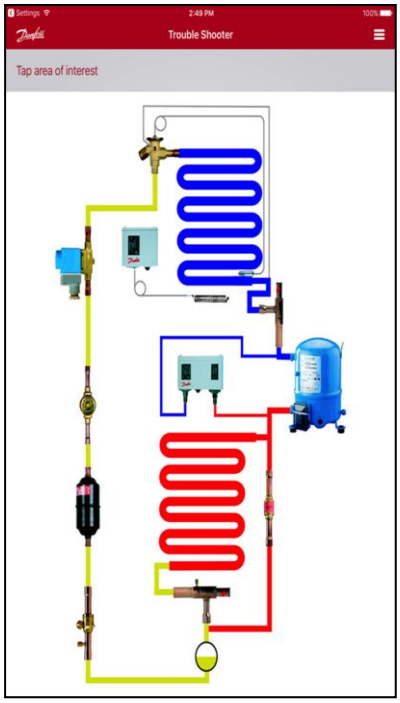
KOTZA HVAC Simulator



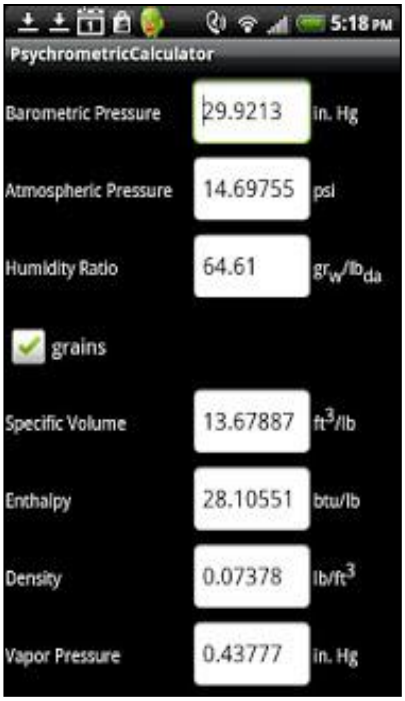
Elite CHVAC Simulator



Danfoss Refrigerant Slider App



Danfoss Trouble Shooter App



Air Lite Psychrometric Calcs

Course Coordinator

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