COURSE OVERVIEW ME1121
O&M, Troubleshooting for Chiller 19XR Chiller

Course Title
O&M, Troubleshooting for Chiller 19XR Chiller

Course Date/Venue
Session 1: August 04-08, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: December 21-25, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Course Reference
ME1121

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 O&M, Troubleshooting for Chiller 19XR Chiller. It covers the emergency handling and incident response; the compressor operation and configuration, evaporator and condenser design; the electrical system and control panel including safety devices and protection features; the pre-startup checks and procedures, startup and shutdown sequences and normal operation monitoring; the operating modes and load control, user interface and system parameters and operational best practices; the routine maintenance schedule, lubrication and oil management and refrigerant circuit maintenance; and the routine maintenance schedule, lubrication and oil management and refrigerant circuit maintenance.

Further, the course will also discuss the tube cleaning and heat exchanger efficiency, electrical and control system maintenance and vibration and noise analysis; the root cause analysis process, symptom-to-problem mapping, troubleshooting flowcharts and documentation and reporting; and troubleshooting startup issues when chiller fails to start, interlock and safety trip conditions, phase imbalance and voltage drop and communication loss with controller.

During this interactive course, participants will learn the surge detection and prevention, high discharge pressure, unusual noise or vibration and compressor motor trip; the evaporator and condenser problems covering insufficient cooling capacity, high approach temperature, chilled water flow issues and air or non-condensables in system, the electrical and control faults comprising of sensor failures and erratic readings, faulty relays or contactors, communication bus errors and controller reset or freeze; the carrier alarm codes, accessing alarm history, clearing and resetting alarms and trends leading to frequent alarms; and the energy efficiency and optimization, commissioning and system balancing, emergency handling and incident response.

Course Objectives

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

- Apply and gain an in-depth knowledge on the operation, maintenance and troubleshooting of chiller 19XR chiller
- Discuss 19XR chiller system, chiller cycle and thermodynamic principles
- Apply compressor operation and configuration and evaporator and condenser design
- Recognize electrical system and control panel including safety devices and protection features
- Carryout pre-startup checks and procedures, startup and shutdown sequences and normal operation monitoring
- Apply operating modes and load control, user interface and system parameters and operational best practices
- Employ routine maintenance schedule, lubrication and oil management and refrigerant circuit maintenance
- Carryout tube cleaning and heat exchanger efficiency, electrical and control system maintenance and vibration and noise analysis
- Illustrate root cause analysis process, symptom-to-problem mapping, troubleshooting flowcharts and documentation and reporting
- Troubleshoot startup issues when chiller fails to start, interlock and safety trip conditions, phase imbalance and voltage drop and communication loss with controller
- Carryout surge detection and prevention, high discharge pressure, unusual noise or vibration and compressor motor trip
- Recognize evaporator and condenser problems covering insufficient cooling capacity, high approach temperature, chilled water flow issues and air or non-condensables in system
- Identify electrical and control faults comprising of sensor failures and erratic readings, faulty relays or contactors, communication bus errors and controller reset or freeze
- Interpret carrier alarm codes, access alarm history, clear and reset alarms and discuss trends leading to frequent alarms
- Apply energy efficiency and optimization, commissioning and system balancing, emergency handling and incident response

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 Q&M, troubleshooting for chiller 19XR chiller for HVAC technicians and engineers, facility maintenance personnel, chiller operators, mechanical and electrical engineers, service and maintenance contractors, energy managers, building management system (BMS) technicians, new technicians and trainees 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)

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: -

- 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. Karl Thanasis, PEng, MSc, MBA, BSc, is **Senior Mechanical & Maintenance Engineer** with over **30 years** of extensive industrial experience. His wide expertise includes **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.

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	***Overview of 19XR Chiller System*** *Introduction to Centrifugal Chillers • Specific Features of Carrier 19XR Series • Applications in HVAC and Industrial Cooling • Key Components and System Layout*
0930 – 0945	*Break*
0945 – 1030	***Chiller Cycle & Thermodynamic Principles*** *Basic Refrigeration Cycle • Role of Evaporator, Compressor, Condenser, and Expansion Device • Heat Transfer and Efficiency • Superheat and Subcooling Concepts*
1030 – 1130	***Compressor Operation & Configuration*** *Centrifugal Compressor Working Principle • Impeller Design and Operation • Guide Vanes and Capacity Control • Lubrication and Bearings*
1130 – 1215	***Evaporator & Condenser Design*** *Shell and Tube Heat Exchanger Overview • Heat Transfer Efficiency • Fouling and Cleaning Considerations • Pressure and Temperature Relationships*
1215 – 1230	*Break*
1230 – 1330	***Electrical System & Control Panel*** *Main Power Supply and Control Wiring • Starter Types (VFD, Wye-Delta, Solid-State) • Motor Protection and Monitoring • Control Panel Navigation (HMI/Touchscreen)*
1330 – 1420	***Safety Devices & Protection Features*** *High/Low Pressure Switches • Flow Switches and Interlocks • Oil Level and Temperature Protection • Emergency Shutdown Features*
1420 – 1430	***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*
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Pre-Startup Checks & Procedures*** *Visual Inspection and Leak Check • Electrical Continuity and Insulation • Refrigerant and Oil Level Check • Water Flow Rate Verification*
0830 – 0930	***Startup and Shutdown Sequences*** *Manual versus Automatic Startup • System Warm-Up and Load Management • Controlled Shutdown Procedure • Avoiding Water Hammer and Surge*
0930 – 0945	*Break*
0945 – 1100	***Normal Operation Monitoring*** *Monitoring Suction/Discharge Pressure • Recording Motor Amps and Temperatures • Trends for Condenser and Evaporator Performance • Oil Pump and Sump Heater Status*

1100 – 1215	***Operating Modes & Load Control*** *Load-Unload Control Mechanism • Chilled Water Reset Function • Part-Load versus Full-Load Efficiency • PID Loops and Setpoint Adjustments*
1215 – 1230	*Break*
1230 – 1330	***User Interface & System Parameters*** *Navigation of Carrier HMI Screens • Alarm History and Event Logs • Customizing Display Settings • Access Levels and Passwords*
1330 – 1420	***Operational Best Practices*** *Daily/Weekly Monitoring Checklist • Recordkeeping and Logbook Maintenance • Seasonal Adjustments and Load Management • Early Warning Indicators of Issues*
1420 – 1430	***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*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Routine Maintenance Schedule*** *Daily/Weekly/Monthly/Annual Activities • Cleaning Filters and Strainers • Motor and Electrical Panel Checks • Water Quality and Chemical Treatment*
0830 – 0930	***Lubrication & Oil Management*** *Oil Sampling and Analysis • Oil Filter and Separator Maintenance • Oil Heater Inspection • Adding or Replacing Oil*
0930 – 0945	*Break*
0945 – 1100	***Refrigerant Circuit Maintenance*** *Leak Detection Methods (Soap, UV, Electronic) • Refrigerant Charging/Recovery Procedure • Sight Glass and Moisture Indicators • Suction Line Insulation and Condition*
1100 – 1215	***Tube Cleaning & Heat Exchanger Efficiency*** *Manual and Chemical Cleaning Techniques • Eddy Current Testing • Cleaning Frequency Recommendations • Fouling Factor Impact on Performance*
1215 – 1230	*Break*
1230 – 1330	***Electrical & Control System Maintenance*** *Tightening Terminals and Checking Connections • Inspection of Relays, Contactors, and Breakers • VFD/Inverter Maintenance • Calibration of Sensors and Transducers*
1330 – 1420	***Vibration & Noise Analysis*** *Baseline Vibration Measurements • Common Sources of Abnormal Vibration • Bearing Condition Monitoring • Use of Vibration Analysis Tools*
1420 – 1430	***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*
1430	*Lunch & End of Day Three*

Day 4

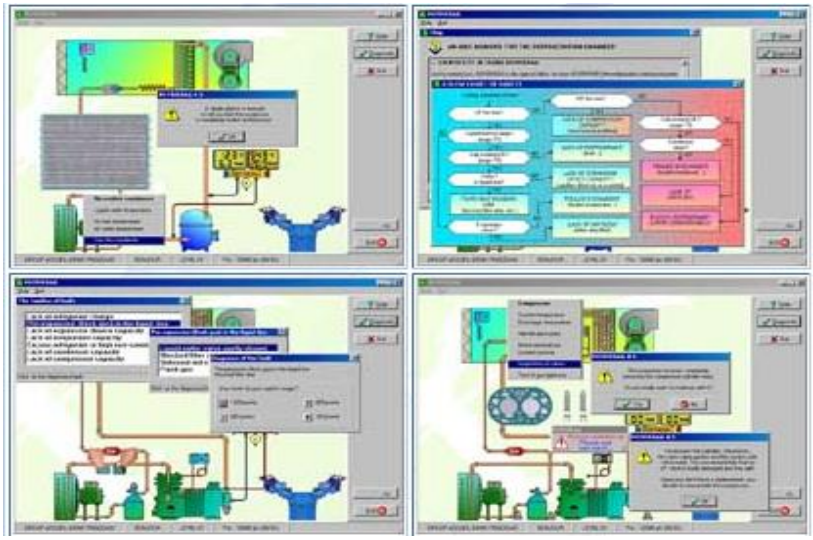
0730 – 0830	***Systematic Troubleshooting Approach*** *Root Cause Analysis Process • Symptom-to-Problem Mapping • Troubleshooting Flowcharts • Documentation and Reporting*
0830 – 0930	***Troubleshooting Startup Issues*** *Chiller Fails to Start • Interlock and Safety Trip Conditions • Phase Imbalance and Voltage Drop • Communication Loss with Controller*
0930 – 0945	*Break*
0945 – 1100	***Compressor-Related Faults*** *Surge Detection and Prevention • High Discharge Pressure • Unusual Noise or Vibration • Compressor Motor Trip*
1100 – 1215	***Evaporator & Condenser Problems*** *Insufficient Cooling Capacity • High Approach Temperature • Chilled Water Flow Issues • Air or Non-Condensables in System*
1215 – 1230	*Break*
1230 – 1330	***Electrical & Control Faults*** *Sensor Failures and Erratic Readings • Faulty Relays or Contactors • Communication Bus Errors • Controller Reset or Freeze*
1330 – 1420	***Alarms & Diagnostics*** *Interpreting Carrier Alarm Codes • Accessing Alarm History • Clearing and Resetting Alarms • Trends Leading to Frequent Alarms*
1420 – 1430	***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*
1430	*Lunch & End of Day Four*

Day 5

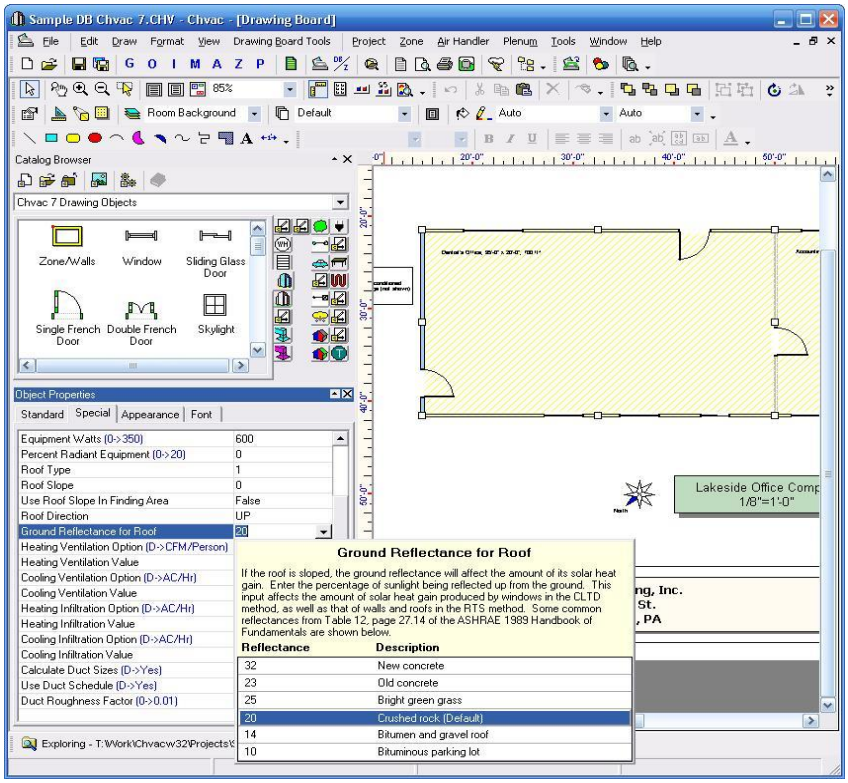
0730 – 0830	***Hands-on Practice on HMI Interface*** *Viewing Operating Parameters • Changing Setpoints Safely • Navigating Service Menus • Alarm Acknowledgment and Reset*
0830 – 0930	***Case Study Analysis*** *Real-World Chiller Fault Scenarios • Step-by-Step Diagnosis • Group Troubleshooting Exercise • Lessons Learned and Prevention*
0930 – 0945	*Break*
0945 – 1100	***Energy Efficiency & Optimization*** *Improving Chiller COP/EER • Off-Peak Operation Strategies • Condenser Water Temperature Control • Integration with BMS Systems*
1100 – 1215	***Commissioning & System Balancing*** *Post-Maintenance Restart Checks • Flow Balancing Across Water Side • Load Testing Procedures • Performance Verification*
1215 – 1230	*Break*
1230 – 1345	***Emergency Handling & Incident Response*** *Refrigerant Leak Response Plan • Electrical Fire or Trip Procedure • Evacuation of Refrigerant Safely • Coordination with Facility Management*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (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 the state-of-the-art simulator "KOTZA HVAC Simulator", "Elite CHVAC Simulator", "Danfoss Refrigerant Slider App", "Danfoss Trouble Shooter App" and "Air Lite Psychrometric Calcs".

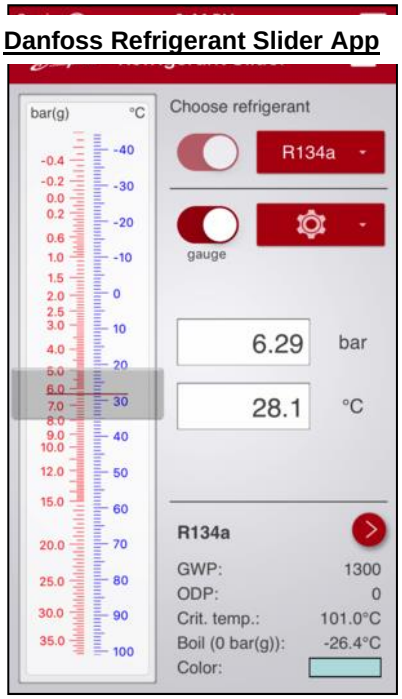


KOTZA HVAC Simulator

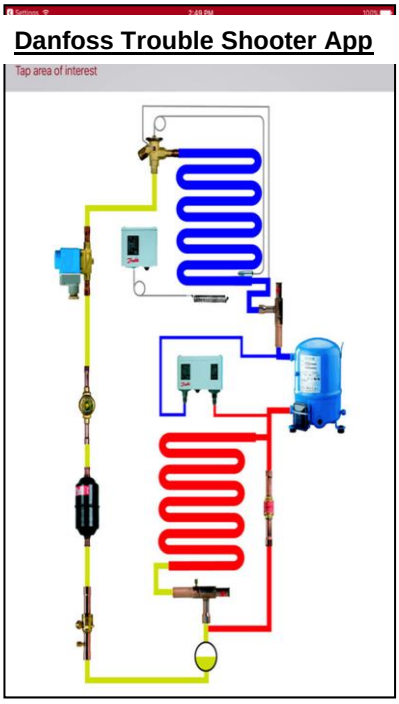


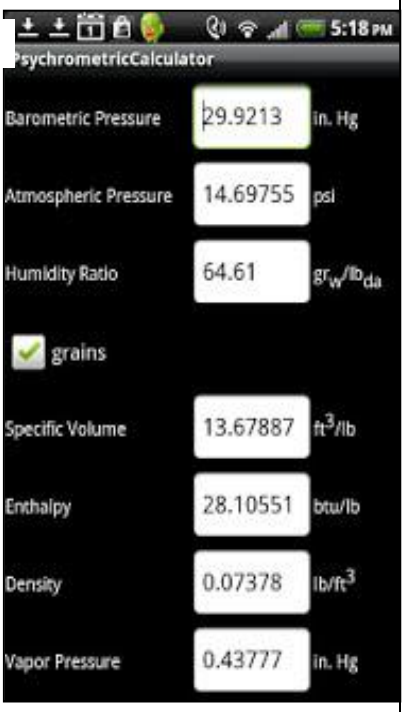
Elite CHVAC Simulator

Danfoss Refrigerant Slider App



Danfoss Trouble Shooter App





Course Coordinator

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