COURSE OVERVIEW ME0710

HVAC, Plumbing, Water Supply & Fire Protection

Design, Installation and Maintenance

Course Title

HVAC, Plumbing, Water Supply & Fire Protection: *Design, Installation and Maintenance*

H-STK© INCLUDED

Course Date/ Venue

July 06-10, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference

ME0710

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 in the class will be applied using the following practical methods:

(**1**) **Industrial Facility Visit:** Course participants will be taken to an industrial facility where they will practice testing, maintenance and troubleshooting. In case that this course is organized inside client premises (In-House), then client shall provide access to its HVAC and refrigeration workshop for practical sessions.

(**2**) **HVAC Simulator:** Participants will use in the class the state-of-the-art HVAC Simulator to practice some of the skills learnt.

This course is designed to provide participants with a detailed and up-to-date overview of HVAC, plumbing water supply and fire protection. It covers the effect of heat and temperature on human comfort; the parameters that must be controlled to achieve human comfort; the principles of thermal balance of buildings; the principles of heat transfer and their impact on heating and cooling load estimates; the HVAC systems for smaller buildings and large buildings; and the comprehensive understanding of hydronic heating, electric heating and familiarization with all-air systems.

During this interactive course, participants will learn the warm air furnaces, air distribution system, air friction in duct systems and duct sizing methods; the different types of HVAC instrumentation & measurement concepts and techniques; the proper HVAC balancing procedures; the various principles of plumbing; the wastewater disposal and drainage design principles; the water supply design; the water supply distribution systems and domestic hot water circulation systems and considerations; and the knowledge on fire protection and fire alarm systems.

Course Objectives

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

- Apply and gain good working knowledge on HVAC, plumbing and fire protection
- Explain the effect of heat and temperature on human comfort and the parameters that must be controlled to achieve human comfort
- Analyze the principles of thermal balance of buildings and explain the principles of heat transfer and their impact on heating and cooling load estimates
- Identify HVAC systems for smaller buildings and large buildings
- Gain awareness on hydronic heating, electric heating and become familiar with all-air systems
- Recognize warm air furnaces, air distribution system, air friction in duct systems and duct sizing methods
- Identify the different types of HVAC instrumentation & measurement concepts and techniques and learn the proper HVAC balancing procedures
- Describe the various principles of plumbing
- Carryout wastewater disposal, drainage design principles and water supply design
- Analyze water supply distribution systems and domestic hot water circulation systems and considerations
- Recognize on fire protection and fire alarm systems

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 HVAC, plumbing water supply and fire protection for engineers, mechanical and maintenance technicians and inspectors responsible for the integrity, design, installation, inspection, maintenance and repair of HVAC, plumbing, water supply and fire protection systems.

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 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 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 **45 years** of extensive industrial experience. His wide expertise includes **Boiler** Maintenance, **Boiler** Control, **Pressure Vessel** Operation, **Advanced Pressure Vessel** Design, **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.

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 Program

The following program is planned for this course. However, the course instructors) 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: ***Sunday, 06th of July 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Heat & Human Comfort*** *Human Comfort Indoors ● Body Temperature Control ● Heat and Temperature Sensible Heat and Latent Heat ● Properties of Atmospheric Air ● Body Heat Balance ● Basic Rules of Thermodynamics ● Mechanics of Sensible Heat Transfer ● Thermal Comfort Criteria ● Measurements*
0930 – 0945	*Break*
0945 – 1115	***Thermal Balance of Buildings*** *Heat Transfer in Buildings ● Conduction ● Convection ● Radiation ● Heat Flow through Air Spaces ● Heat Flow through Built-Up Sections ● Heat Loss through Surfaces on and Below Grade ● Heat Flow through Windows and Doors Heat Loss from Air Infiltration and Ventilation ● Heat Loss to Adjacent Unheated Spaces ● Summary of Building Heat Losses ● Building Heat Loss Calculation Procedure*
1130 – 1230	***Thermal Balance of Buildings (cont'd)*** *Outside Design Conditions ● Evolution of Modern Climate Control Systems ● Heating Systems Fuels ● Heating Systems ● Building Heat Gain Components Residential Heat Gain (Cooling Load) Calculations ● Nonresidential Heat Gain Calculation ● Cooling Load Calculation Forms ● The Psychrometric Chart ● Components of the Psychrometric Chart ● Basic HVAC Processes on the Psychrometric Chart*
1230 – 1245	*Break*

1245 – 1420	***HVAC for Smaller Buildings*** *Review of the Need for Mechanical Equipment ● HVAC: Typical Design Processes ● Equipment Location and Service Distribution ● Controls for Smaller Building Systems ● Refrigeration Cycles ● Cooling-Only Systems ● Heating-Only Systems ● Heating/Cooling Systems ● Psychrometrics and Refrigeration*
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: ***Monday, 07th of July 2025***

0730 – 0930	***Large Building HVAC Systems*** *HVAC and Building Organization ● HVAC System Types ● Central Equipment ● Air Distribution within Spaces ● All-Air HVAC Systems ● Air and Water Systems ● All-Water Systems ● District Heating and Cooling ● Cogeneration*
0930 – 0945	*Break*
0945 – 1130	***Hydronic Heating*** *Hydronic Systems ● Components of a Hydronic Heating System ● Hot Water Boilers ● Definitions and Basic Equipment Functions ● Expansion Tank ● Circulator ● Terminal Units ● Piping Arrangements ● Hydronic Heating System Control ● Piping Design Factors ● Design Procedure ● Basic Residential Hydronic Heating System Design ● Preliminary Design Considerations ● Hydronic Heating Design of a Large Residence ● Hydronic Heating Design of an Industrial Building ● Miscellaneous Design Considerations*
1130 – 1230	***Electric Heating*** *Electric Resistance Heating ● Resistance Heaters ● Resistance Heating Equipment ● Residential Electric Heating Design ● Nonresidential Electric Heating Design*
1230 – 1245	*Break*
1245 – 1420	***All-Air Systems*** *Air System Characteristics ● Components of All-Air Systems ● Heat-Carrying Capacity of Ducted Air Flow ● Air Pressure in Ducts*
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: ***Tuesday, 08th of July 2025***

0730 – 0830	***Warm Air Furnaces*** *Furnace Components and Arrangements ● Furnace Energy and Efficiency Considerations ● Furnace Types ● Warm Air Furnace Characteristics ● Noise Considerations ● Warm Air Furnace Blowers ● Furnace Accessories*
0830 – 0930	***Air Distribution System*** *Ducts ● Duct Fittings and Air Control Devices ● Duct Insulation ● Air Distribution Outlets ● Outlet Characteristics ● Outlet Selection, Location and Application ● Outlet Air Patterns*
0930 – 0945	*Break*

0945 – 1130	***Air Friction in Duct Systems*** *Air Friction in Straight Duct Sections ● Noncircular Ducts ● Air Friction in Duct Fittings ● Sources of Duct System Pressure Loss*
1130 – 1230	***Duct Sizing Methods*** *Equal Friction Method ● Modified Equal Friction Method ● Extended Plenum Method ● Semi-Extended Plenum (Reducing Plenum) Method*
1230 – 1245	*Break*
1245 – 1420	***HVAC Instrumentation & Measurement*** *Temperature Measurement ● Pressure Measurement ● Air Velocity Measurements ● Velocity Measurement Techniques ● Air Flow Measurement*
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: Wednesday, 09th of July 2025

0730 – 0930	***HVAC Balancing Procedures*** *Preparation for Balancing an Air System ● Balancing an Air System ● Preparation for Balancing a Hydronic System ● Balancing a Hydronic System*
0930 – 0945	*Break*
0945 – 1130	***Principles of Plumbing*** *Basic Principles of Plumbing ● Plumbing System Design Constraints ● Minimum Plumbing Facilities ● Hydraulics ● Static Pressure ● Pressure Measurement ● Liquid Flow ● Flow Measurement ● Dimensions and Conversions ● Plumbing Materials ● Piping Materials and Standard Fittings ● Piping Installation ● Valves ● Fixtures ● Drawing Presentation*
1130 – 1230	***Drainage & Wastewater Disposal*** *Sanitary Drainage-General Principles ● Sanitary Drainage Piping ● Hydraulics of Gravity Flow ● Drainage Piping Sizing ● Drainage Accessories ● Traps ● Principles of Venting ● Types of Vents ● Drainage and Vent Piping Design ● Residential Drainage Design ● Nonresidential Drainage Design*
1230 – 1245	*Break*
1245 – 1420	***Domestic Hot Water*** *General Considerations ● Instantaneous Water Heaters ● Storage-Type Hot Water Heaters ● Hot Water Circulation Systems ● Sizing of Hot Water Heaters*
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*

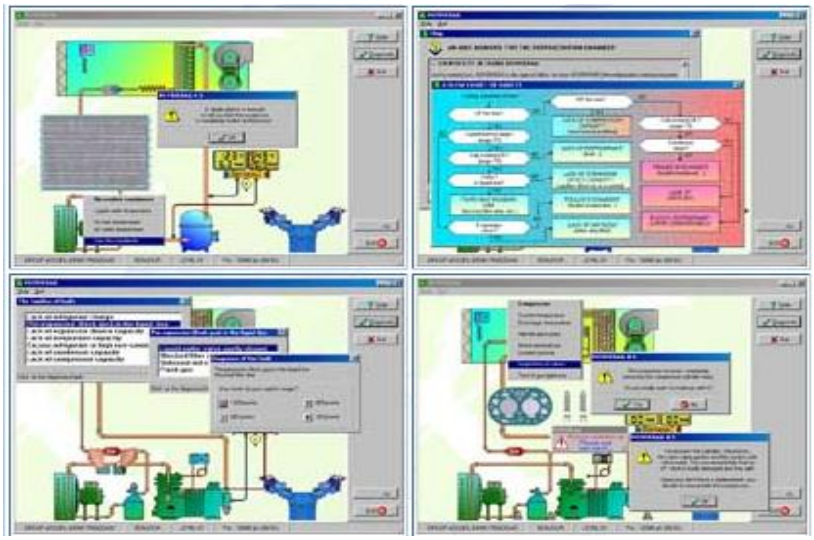
Day 5: **Thursday, 10th of July 2025**

0730 – 0930	***Water Supply Design*** *Valving ● Backflow Prevention ● Water Hammer Shock Suppression ● Residential Water Service Design ● Nonresidential Water Supply Design*
0930 – 0945	*Break*
0945 – 1100	***Fire Protection*** *Design for Fire Protection ● Smoke Management ● Water for Fire Suppression ● Other Fire Suppression Methods ● Lightning Protection*
1100 – 1230	***Fire Alarm Systems*** *General Considerations ● Fire Codes, Authorities and Standards ● Fire Alarm Definitions and Terms ● Types of Fire Alarm Systems ● Circuit Supervision ● Conventional Systems ● System Coding ● Signal Processing ● Addressable Fire Alarm Systems ● Addressable Analog (Intelligent) Systems ● Automatic Fire Detection: Incipient Stage ● Automatic Fire Detection: Smoldering Stage ● Automatic Fire Detection: Flame Stage*
1230 – 1245	*Break*
1245 – 1345	***Fire Alarm Systems (cont'd)*** *Automatic Fire Detection: Heat Stage ● Special Types of Fire Detectors ● False Alarm Mitigation ● Manual Stations ● Sprinkler Alarms ● Audible and Visual Alarm Devices ● General Recommendations ● Residential Fire Alarms ● Multiple-Dwelling Alarm Systems ● Commercial and Institutional Building Alarm Systems ● High-Rise Office Building Fire Alarm Systems ● Industrial Facilities*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

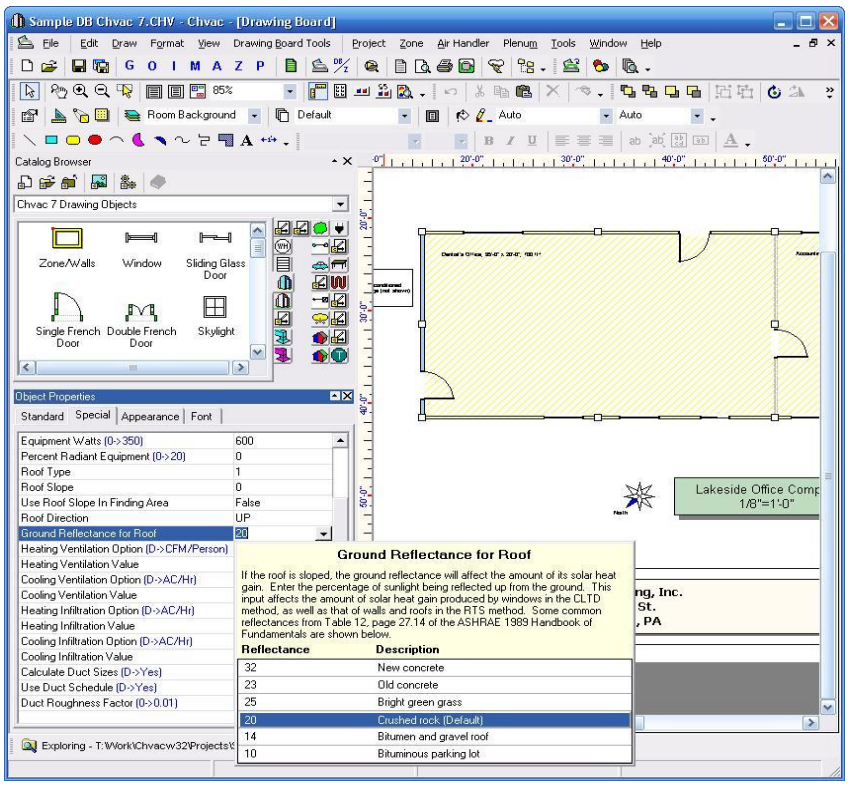
Practical Sessions/Site Visit

Simulator (Hands-on Practical Sessions)

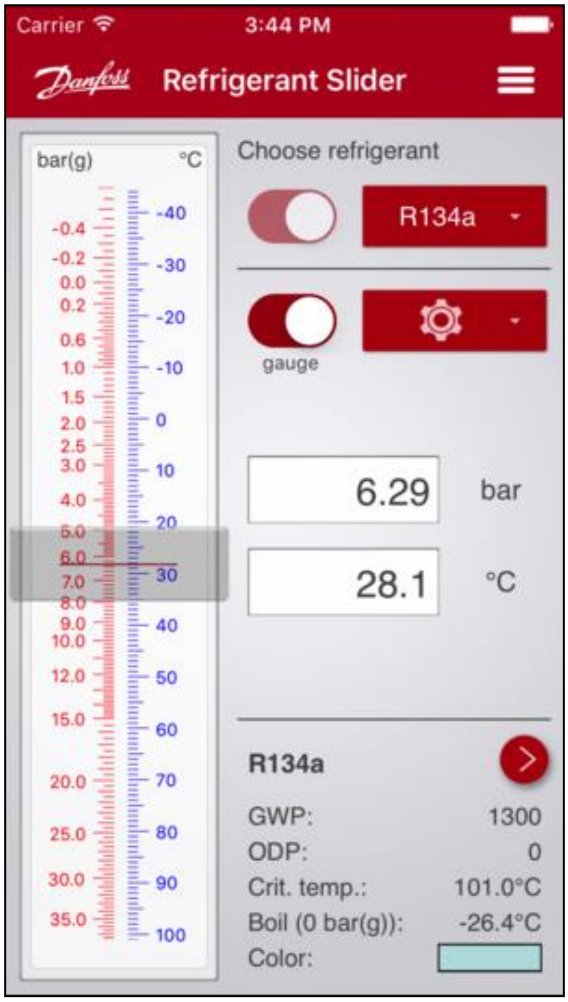
Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the simulator "KOTZA HVAC Simulator", "Elite CHVAC Simulator", "Danfoss Refrigerant Slider App" and Danfoss Troubleshooter App".



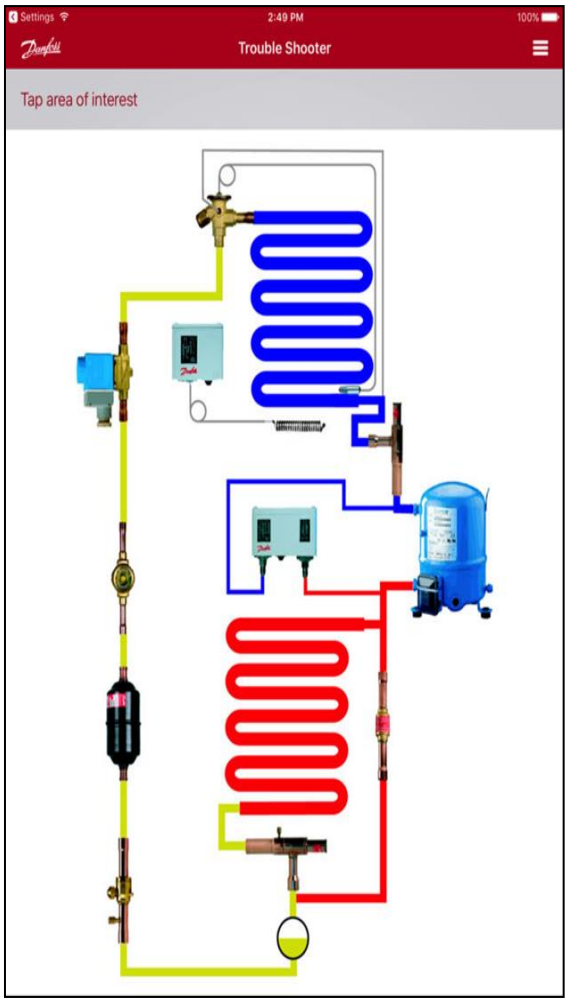
KOTZA HVAC Simulator



Elite CHVAC Simulator



Danfoss Refrigerant Slider App



Danfoss Troubleshooter App

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