

RAC LAB TECHNICAL SPECIFICATIONS

COMPUTERIZED AIR CONDITIONING SYSTEM TRAINER (SPLIT TYPE)

Make: EEI, Model: RAC05

SYSTEM SPECIFICATIONS:

- Indoor unit includes copper finned coil of 1 to 1.5tr with Provision for variable airflow rate and remote control system mounted on the panel make LG/VOLTAS/ equivalent.
- Out door unit includes Compressor Hermetically Sealed, Rotary type 1 to 1.5 TR GMCC/ equivalent, Condenser An air-cooled condenser of suitable Capacity with Fan.
- Expansion System Capillary/auto expansion system.
- Refrigerant Freon R22/R32/R410a

Measuring instruments with pc interfaced facility

- Dual power watt meter
- Multi channel temperature scanner, -50 to 150°C
- Thermocouples Teflon coated (PT-100 type)-8 no.
- Gauges Pressure and Compound gauges for HP and LP with HP-LP cut-out (analogue)
- Pressure transducer with dual pressure indicator.
- Digital refrigerant flow sensor.
- Dual channel RH indicator with RH sensor in and out
- Thermometers Wet & Dry Thermometers are Provided with RH Chart (analogue)
- Flow Visualization Suitable Site Glass.
- Experimental Capability Actual, theoretical COP, Psychometric Processes
- Manual Self-explanatory Instruction manual, sample calculation & Refrigerant chart.

Extra Feature

Anemometer for Air Flow Measurement

Data acquisition with application software

National instruments Lab View based application software with data acquisition signal conditioner to log the data and saved the files in excel and word format.



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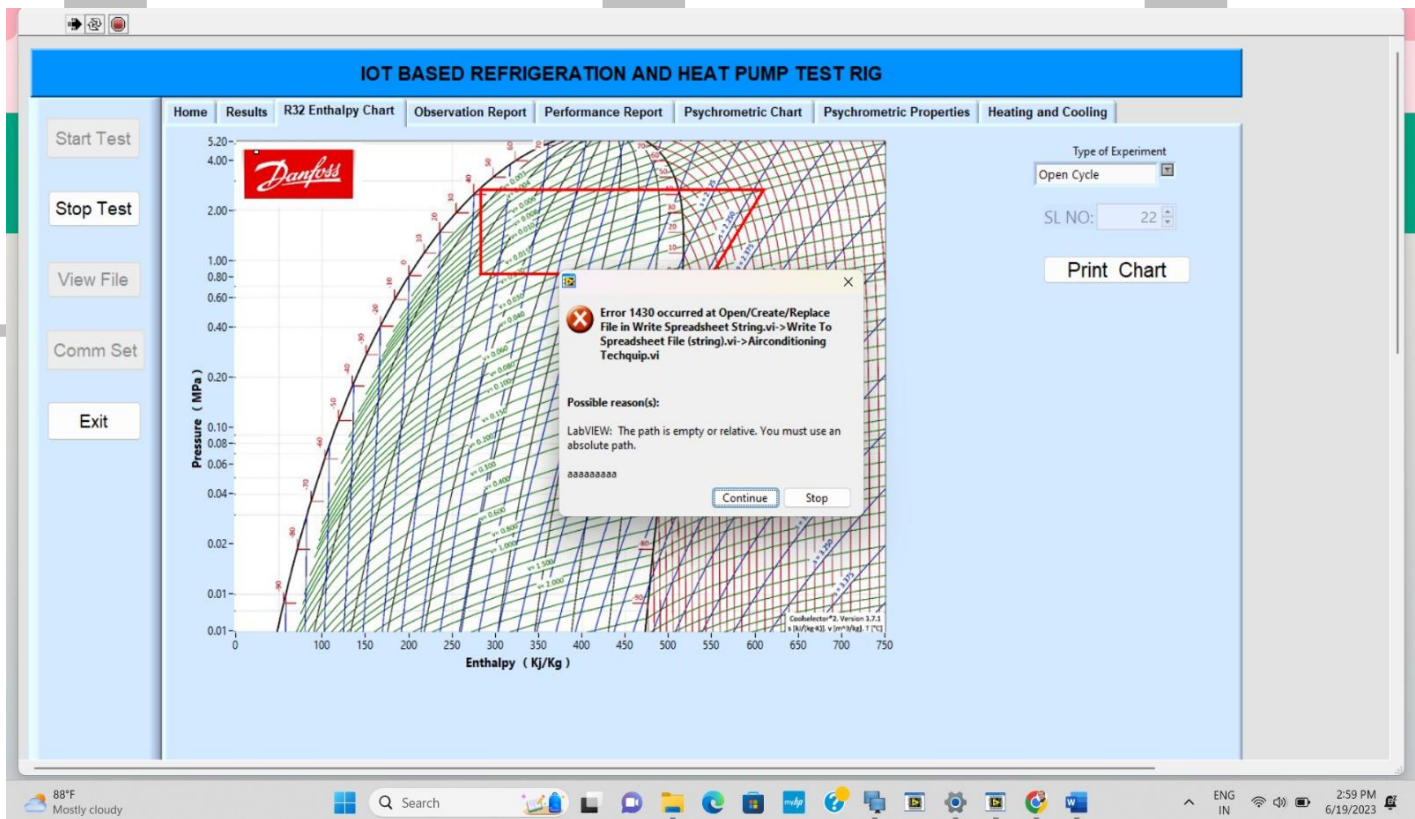
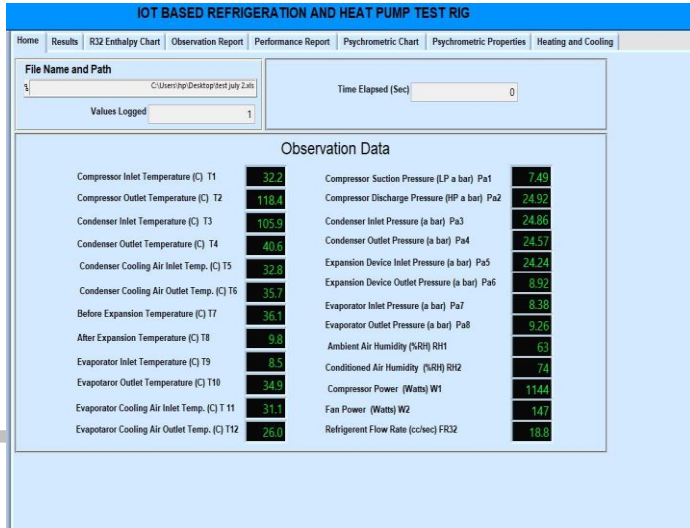
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Manufacturing : Plot no 15, Street no 1, Indra garden, Rajendra Nagar Industrial Area, Mohan nagar, Ghaziabad- 201007 (Delhi NCR)

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- The whole system is mounted on a Metallic powder coated frame and panel with Caster Wheels
- Floor area required: 1.5mtr x1.0 mtr floor space
- Power supply required: single phase, 230volts, 10 amps, and 50Hz.



COMPUTERIZED AIR CONDITIONING SYSTEM TRAINER (DUCT TYPE)

Make: EEI, Model: RAC010

SYSTEM COMPONENTS & SPECIFICATIONS:

- Air Duct with Acrylic Transparent Window
- Compressor Hermetically Sealed, Rotary type 1 TR Make: HITACHI/GMCC.
- Condenser An air-cooled condenser with axial fan suitable capacity
- Expansion System Capillary
- Evaporator An air-cooled Evaporator Coil of suitable Capacity with
- Axial type Blower & Provision for variable airflow rate.

- Refrigerant Freon R-22

Measuring instruments

- Digital volts meter, ammeter and energy meter for power input measurements
 - Multi-channel temperature indicator, -50 to 150°C
 - Thermocouples Teflon coated (PT-100 type)-8 no.
 - Gauges Pressure and Compound gauges for HP and LP with HP-LP cut-out
 - Thermometers Wet & Dry Thermometers are provided with RH Chart.
 - Flow Visualization by Site Glass.
 - Humidification A suitable capacity Steam generator with 2kw heater.
 - De- Humidification Finned Heaters with regulators are provided as Pre / Re heaters
 - Manual Self-explanatory Instruction manual.
 - Experimental Capability Actual, theoretical COP, Psychometric Processes
 - The whole system is mounted on a Metallic powder coated frame and panel with Caster Wheels
- Floor area required: 1.2mtr x0.6 mtr floor space



Power supply required: single phase, 230volts, 15 amps, and 50Hz.

Measuring instruments with pc interfaced facility

- Dual power watt meter
- Multi-channel temperature scanner, -50 to 150°C
- Thermocouples Teflon coated (PT-100 type)-6 no.
- Gauges Pressure and Compound gauges for HP and LP with HP-LP cut-out (analogue)
- Pressure transducer with dual pressure indicator.
- Digital refrigerant flow sensor.

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- Dual channel RH indicator with RH sensor in and out
- Thermometers Wet & Dry Thermometers are Provided with RH Chart (analogue)
- Flow Visualization Suitable Site Glass.
- Experimental Capability Actual, theoretical COP, Psychometric Processes
- Manual Self-explanatory Instruction manual, sample calculation & Refrigerant chart.

Extra Feature

Anemometer for Air Flow Measurement

Data acquisition with application software

National instruments Lab View based application software with data acquisition signal conditioner to log the data and saved the files in excel and word format

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VAPOR COMPRESSION TYPE CASCADE REFRIGERATION SYSTEM TRAINER with data logger

Make: EEI, Model: RAC07

A cascade refrigeration system consists of two independently operated single-stage refrigeration Systems. A lower system that maintains a lower evaporating temperature and produces refrigeration Effect and a higher system that operates at a higher evaporating temperature. It uses one refrigerant to condense the other primary refrigerant that is operating at the desired evaporator temperature. The Experimental unit provides the basic experiments to know the operating behavior and the important Characteristic variables of centrifugal pump. The System comprises the use of different refrigerants in each cycle of the cascade



SYSTEM COMPONENTS & SPECIFICATIONS:

- High Pressure Side Compressor: Hermetically sealed, 0.5-0.75 TR
- Low Pressure Side Compressor: Hermetically sealed, 0.5-0.75 TR
- Evaporator: Copper Coil immersed in insulated water tank of stainless steel 304 grade water tank.
- Ethylene Glycol to achieve lower temperature by mixing in water: 2-2.5 liter.
- Condenser: Copper, forced air-cooled.
- Cascade Condenser: Tube and Tube type of copper tube/Plate type Heat Exchanger.
- Expansion System Capillary Expansions
- Refrigerant Freon R-134a and R 22

Measuring instruments with data logger facility 16 channel

- Digital volts meter, ammeter and energy meter for power input measurements
- Thermocouples Teflon coated (PT-100 type)-10 nos.
- Gauges Pressure and Compound gauges for HP and LP with HP-LP cut-out-2 no's
- Digital refrigerant flow sensor -2nos
- Pressure transducers- 4nos
- Flow Visualization Suitable Site Glass.
- Stop Watch Digital, 1/10 of a second, Racer/Pacer Make
- Data logger 16 channels with pc interface converter USB and software.

Experimentation to be performed:

To study the principle of operation of a cascade refrigeration system.

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To calculate the COP of individual Refrigeration cycle.

To calculate the COP of cascade cycle.

To determine the Refrigeration effect, Work output, Actual COP, Carnot COP, Theoretical COP, Tonnage of refrigeration.

To study various parameters and heat balance of cascade refrigeration system.

- The whole system is mounted on a Metallic powder coated frame and panel with Caster Wheels
- Floor area required: 1.3mtr x 0.8mtr floor space
- Power supply required: single phase, 230volts, 15 amps, and 50Hz.

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DIGITAL VAPOR COMPRESSION REFRIGERATION SYSTEM ICE PLANT TRAINER with data logger

Make: EEI, Model: RAC08

SYSTEM COMPONENTS & SPECIFICATIONS:

Control Panel Stand Alone Metallic powder coated panel with
Caster Wheels

Compressor Hermetically Sealed, Reciprocating type 1/3HP
Emerson / Equivalent.

Condenser An air cooled condenser of suitable Capacity with
Fan

Expansion System Capillary Expansion

Evaporator/ Brine Tank A suitable SS tank copper Coiled,
housed in a metallic powder coated MS chamber with proper
insulation with stirrer .Ice Cans Suitable size ICE cans made of
GI sheet with supporting frame.

Refrigerant Freon R-134A

Energy meter Energy meter 2.5- 5 Amps, Bentex make

- Thermocouples Teflon coated PT-100(TYPE)-5 no.
- Gauges Pressure and Compound gauges for HP and LP with HP-LP cut-out
- Experimental Capability Actual, Theoretical & Carnot COP, Ton refrigeration, Relative COP & Ice manufacturing capacity per day.
- Manual Self-explanatory Instruction manual, sample calculation & 134A chart Temperature Indicator Digital Temperature Indicator, -50 to 150°C with TSS



Measuring instruments with data logger facility 8 channel

- Digital volts meter, ammeter and energy meter for power input measurements
- Thermocouples Teflon coated (PT-100 type)-6 nos.
- Gauges Pressure and Compound gauges for HP and LP
- Digital refrigerant flow sensor -1nos
- Pressure transducers- 2nos
- Flow Visualization Suitable Site Glass.
- Data logger 8 channels with pc interface converter USB and software.

Experimentation to be performed:

To determine the Refrigeration effect, Work output, Actual COP, Carnot COP, Theoretical COP, Tonnage of refrigeration.

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- The whole system is mounted on a Metallic powder coated frame and panel with Caster Wheels
- Floor area required: 1.3mtr x 0.8mtr floor space
- Power supply required: single phase, 230volts, 15 amps, and 50Hz.

VAPOR ABSORPTION TYPE REFRIGERATION SYSTEM TRAINER with Data Logger

Make: EEI, Model: RAC03

SYSTEM COMPONENTS & SPECIFICATIONS:

- The System has no moving parts at all, which makes it Silent and very durable.
- Refrigerant: Mixture of three fluid system Ammonia (NH₃) + Water (H₂O) + Hydrogen (H₂)
- Gases: Non – CEC, Non – HCFC, Non – FCKW, Non – Freon
- Mode of heating System: Externally heated by electric resistance heater
- Evaporator: Coil Type evaporator with facility to determine performance efficiency ratio with the help of supply water facility.
- Volume of Cabinet: 40 Ltrs.
- Voltage Input – 65 Watts, Electrical Consumption/24 Hrs. – 0.8 kWh, Auto Defrost



Measuring instruments with data logger facility 8 channel

- Digital volts meter, ammeter and energy meter for power input measurements
- Thermocouples Teflon coated (PT-100 type)-6 nos.
- Data logger 8 channels with pc interface converter USB and software.

Extra Feature optional –

Hot water circulation for solar water heater or exhaust heat gas circulation

- Experimental Capability Actual, theoretical COP
- Manual Self explanatory Instruction manual, sample



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calculation

- The whole system is mounted on a Metallic powder coated frame and panel with Caster Wheels
- Floor area required: 0.8mtr x0.8 mtr floor space
- Power supply required: single phase, 230volts, 5 amps, and 50Hz.

DIGITAL DOMESTIC REFRIGERATOR TRAINER

Make: EEI, Model: RAC04

SYSTEM COMPONENTS & SPECIFICATIONS:

- Control Panel Stand Alone Metallic powder coated panel with Caster Wheels
- Refrigerator single door/double door 165 to 200 ltr
- Condenser An air cooled condenser inbuilt
- Expansion System Capillary Expansion
- Provision for evaporator heater to load the refrigerator
- Refrigerant Freon R-134a/600a
- Energy meter Energy meter 2.5- 5 Amps, Bentex make
- Temperature Indicator Digital Temperature Indicator, -50 to 150°C with multi-channel switch
- Thermocouples Teflon coated PT-100(TYPE)-8 no.
- Gauges Pressure and Compound gauges for HP and LP with cutoff switch.
- Experimental Capability Actual, Theoretical & Carnot COP, Ton refrigeration, Relative COP
- Manual Self explanatory Instruction manual, sample calculation
- The whole system is mounted on a Metallic powder coated frame and panel with Caster Wheels
- Floor area required: 0.8mtr x0.8 mtr floor space
- Power supply required: single phase, 230volts, 5 amps, and 50Hz.



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EXPERIMENT ON EVAPORATIVE TYPE DESERT AIR COOLER SYSTEM TRAINER

Make: EEI, Model: RAC12

This study is to calculate the actual effectiveness of evaporative cooler and then calculate the supply air temperature from the cooler and comparing with comfort condition for space users.

Desert Cooler Trainer works on the principle of evaporative cooling. It is used mostly in the dry hot regions.

It consists of a fan, which sucks the air from atmosphere through the pads, which are used in desert coolers very frequently.

The difference in DBT & WBT at inlet and outlet can be measured hence the RH from the charts.

Also the amount of water evaporated can be calculated by knowing the water level difference in the reservoir.

Specifications: -

1. Fan connected to 1/2 HP motor.
2. Air Cooler Pump to circulate water.
3. DBT & WBT Thermometer and digital temperature meter to measure at inlet and outlet air and water temperature.
4. digital anemometer to measure the airflow.

A technical manual accompanies the unit.

Services Required: -

1. Floor Area – 1, X 1 m. X 1 -5m. Height.
2. 220 V., 15 Amps. , Single Phase Stabilized power supply.



To study and demonstration board of different refrigeration tools different basic components used in air-conditioning and refrigeration system

Make: EEI, Model no: RAC 014

This model will be made out of original parts. The model will be suitably sectioned to demonstrate the internal construction details showing the minute information, and working of the same, the model will be suitably painted and mounted on a metal or wooden base.

System consists of:

Different types of expansion devices, different types of electrical controls, HP-LP pressure controls, pressure measure devices like pressure gauges, filter dryers, sight glass, wet and dry bulb thermometer, temperature measure thermometers, liquid receivers, hand shut-off valves, insulation foams, starting relays, capacitors, heaters,



STUDY OF HERMETICALLY SEALED COMPRESSOR ROTARY AND RECIPROCATING TYPE 1 TR (CUT SECTION MODEL)

Make: EEI, Model no: RAC 01a

This model will be made out of original parts. The model will be suitably sectioned to demonstrate the internal construction details showing the minute information, and working of the same, the model will be suitably painted and mounted on a metal or wooden base.

1. Hermetically sealed rotary compressor
 2. Hermetically sealed reciprocating compressor
- Both compressors are mounted on a single frame



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MULTISTAGE REFRIGERATION SYSTEMS

Make: EEI, Model: RAC015

Multistage refrigeration systems are widely used where ultra-low temperatures are required, but cannot be obtained economically through the use of a single-stage system. This is due to the fact that the compression ratios are too large to attain the temperatures required to evaporate and condense the vapor. There are two general types of such systems: cascade and multistage.

SYSTEM COMPONENTS & SPECIFICATIONS:

1. Three compressors rotary or reciprocating type (0.5 TR to 1.5 TR) connected in series in the same refrigeration system. (Three different refrigerants namely R-410a/R-32, R-134a and R404a)
2. Three-expansion devices (capillary)
3. Two intercoolers/sub coolers (pipe in pipe counter flow type)
4. Evaporator double wall with pup insulation to avoid temperature loss (chiller type approx.25 to 40 ltr capacity made of stainless steel 304 food grade).
5. Evaporator loading: provision is made for load the evaporator either heating or hot water circulation system.
6. Condenser: Air-cooled condenser of suitable capacity with motor and fan fitted.
7. Hand shutoff valves wherever necessary.
8. Sight glass to measure refrigerant conditions at each line.
9. Filter dryer at each line.
10. Heavy gauge copper tubes for making lines with brass flare fittings.
11. Safety cut off devices at each compressor to protect compressors.
12. Proper Insulation added wherever necessary.
13. Standard electrical accessories used for operations. (On/off switches, indicators cutoff switches).



Measuring instruments with data logger facility 24 channel

- Temperature transducers 12 no's PT 100 TYPE (connected at different locations in the system)
- Pressure transducers 6 no's 25 and 40 bar (each compressor in/out and expansion inlet)
- Refrigerant flow transducers 3 no's pulse type 1/4th line size (liquid line at each compressor)
- Pressure gauges liquid filled analogue type 6 no's 1/4th line size (each comp in and out line)
- Energy meter digital 3 no's for each compressor power input measure.
- Digital volts meter 0- 300 volts ac to measure main supply input.
- Digital ammeter 0- 10 amps ac to measure each compressor



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- power consumption.
- Data logger 24 channels with pc interface converter USB and software.

The whole setup is mounted on well-designed fabricated frame and sheet metal control panel with dual powder coated for long life and good aesthetic, four lockable caster wheels are fitted for vibration absorbs and easy transportation.

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TECHNICAL SPECIFICATIONS

VAPOR COMPRESSION TYPE DEDICATED SUBCOOLING REFRIGERATION SYSTEM TRAINER

Make: EEI, Model: RAC011

A vapor compression refrigeration system consists of two independently operated single-stage refrigeration Systems. Dedicated mechanical sub cooling cycles utilize a small mechanical vapor-compression cycle, coupled to the main cycle at the exit of the condenser, to provide sub cooling to the main refrigeration cycle. It uses one refrigerant to condense the other primary refrigerant that is operating at the desired evaporator temperature. The System comprises the use of different refrigerants in each cycle.

SYSTEM COMPONENTS & SPECIFICATIONS:

- Main cycle High Pressure Side Compressor: Rotary Hermetically sealed, 1.5 TR-1no
- Main cycle Air cooled condenser: suitable capacity with fan motor-1no
- Lower cycle/Low Pressure Side Compressor: reciprocating Hermetically sealed, 0.5 TR-1no
- Lower cycle Air cooled condenser: suitable capacity with fan motor-1no
- Main cycle Evaporator: Copper Coil immersed in insulated water tank OR plate type evaporator. OR Air cooled evaporator -1no
- Lower cycle evaporator/Dedicated sub cooler: Tube in Tube type of copper tube.-1no
- Expansion System Capillary Expansions-2nos
- Refrigerant Freon R-134A and R-22/32
- Gauges Pressure and Compound gauges for HP and LP with HP-LP cut-out-2 sets with necessary copper fittings
- Flow Visualization Suitable Site Glass-2 no's with necessary copper fittings
- Filter dryer - 2nos with necessary copper fittings
- The whole system is mounted on a Metallic powder coated frame and panel with Caster Wheels
- Floor area required: 1.3mtr x 0.8mtr floor space
- Power supply required: single phase, 230volts, 15 amps, and 50Hz.



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Measuring instruments with data logger facility 16 channel

- Digital volts meter, ammeter and energy meter for power input measurements
- Thermocouples Teflon coated (PT-100 type)-10 nos.
- Gauges Pressure and Compound gauges for HP and LP with HP-LP cut-out-2 no's
- Digital refrigerant flow sensor -2nos
- Pressure transducers- 4nos
- Data logger 16 channels with pc interface converter USB and software.

Experimentation to be performed:

To study the principle of operation of a dedicated sub cooling refrigeration system.

To calculate the COP of individual Refrigeration cycle.

To calculate the COP of dedicated cycle.

To determine the Refrigeration effect, Work output, Actual COP, Carnot COP, Theoretical COP, Tonnage of refrigeration.

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