

Air Conditioning and Ventilation System-Experimental Bench

KS/ME/AC&VSEB

The Air Conditioning and Ventilation System – Experimental Bench is a laboratory-scale training and experimental unit designed for the practical study of air-conditioning, ventilation, air-flow and psychrometric processes. The bench provides a controlled arrangement for circulating and conditioning air through an experimental air-duct system. It enables students to observe and analyze changes in air temperature, relative humidity, air-flow rate and differential pressure under different operating conditions.

The system incorporates suitable air-moving, cooling, heating, humidity-control and air-flow regulation arrangements, allowing individual processes and their combined effects to be demonstrated. Measuring sensors and instruments are provided at appropriate locations for monitoring the operating parameters and evaluating the performance of the system.

Technical Specifications:

Compressor unit with refrigeration capacity: 450-490 W at standard operating condition (7.2 °C/54.4°C)

Receiver volume: 0.6-0.8 liters

Refrigerant (Preferably): R-513A or R-134a

Temperature Measurement: Sensor capability ranges from (-50 °C to +100 °C)

Pressure Range: Suction side: (approx. 1 to 9 bar);

Discharge side: vacuum to high-pressure conditions (approx. 1 to 15 bar)

Mass Flow range: 0 to 19 kg/h.

Air duct: 136×136×435 mm (Proposed requirement)

Evaporator with air cooler transfer area: 900-1000 cm²

Radial fan: 80W-100W with flow rate: 255-260 m³/h

Differential pressure: up to 10 mbar



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The Apparatus must have followings:

Apparatus / Training Unit: Test rig of a Simple Air Conditioning System designed as a training unit for demonstration and study of basic air-conditioning processes.

Air Duct: Air duct with transparent front section for clear observation of the air-conditioning process.

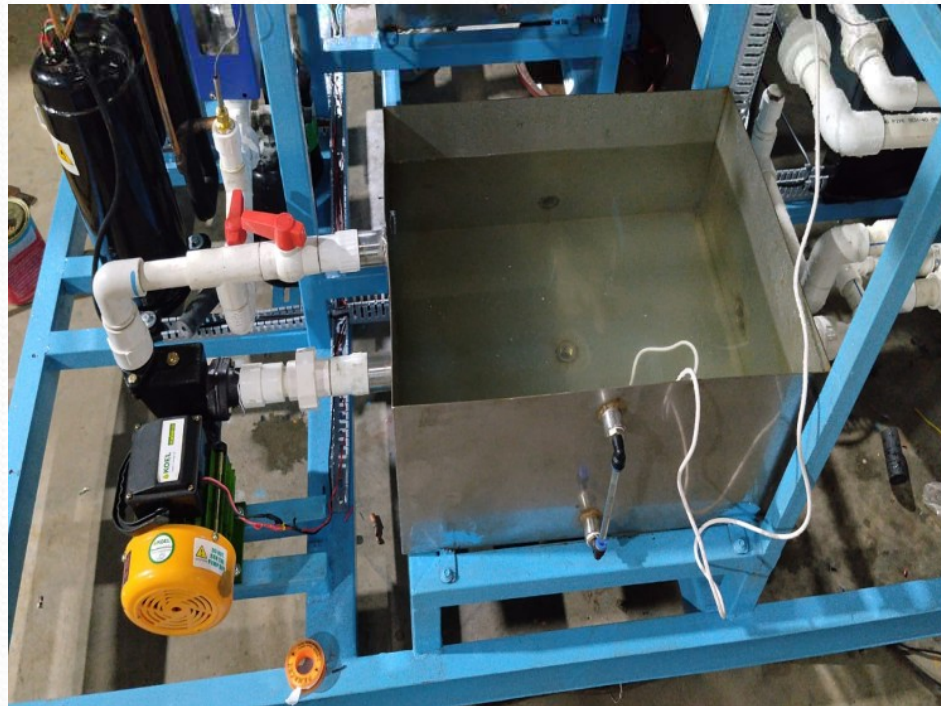
Evaporator / Air Cooler: Transparent-front evaporator serving as the air cooler, allowing visualization and study of cooling of the air stream.

Air Circulation: Radial fan provided for forced circulation of air through the duct.

Air Flow Control: Throttle valve provided for controlling the air flow through the system.

Expansion Element: Thermostatic Expansion Valve (TXV) provided as the expansion element of the refrigeration circuit.

Temperature Measurement: Sensors for measuring air/refrigerant temperature at relevant points of the system.



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Humidity Measurement: Sensors for measuring relative humidity of the air stream.

Differential Pressure Measurement: Differential-pressure sensor for measuring pressure difference across the air duct/measurement section.

Air Flow Measurement: Temperature, humidity and differential-pressure measurements shall facilitate determination of the volumetric air flow rate.

Component Operation: Provision for individual operation of system components for training and demonstration purposes.

System Operation:

Provision for operation and demonstration of the complete air-conditioning system.

Operation of individual components and of the system and fault simulation via software and data acquisition via USB under Windows 11.



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Major Experiments :

1. Study of basic air-conditioning and ventilation processes
2. Measurement of air temperature and relative humidity
3. Determination of volumetric air-flow rate
4. Study of air cooling and heating
5. Study of humidification and dehumidification
6. Study of air-flow regulation using dampers/throttle arrangements
7. Study of pressure drop/differential pressure in air ducts
8. Study of ventilation and air circulation
9. Performance study of air-conditioning components
10. Recording and analysis of experimental parameters



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Warranty: 2 years
Delivery Period: 16 Weeks

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