KR-115

Refrigeration Cycle and Heat Pump System

KR-115 is designed to learn the theory of Heat Transfer in refrigeration engineering. With proper setup, KR-115 can be emulated as a Refrigeration or Heat Pump system. All system components are mounted on the front panel so students can directly observe, touch the components, and hear the noise produced by the components while it is running under either Refrigeration or Heat Pump cycle.

KR-115 offers three expansion devices available for the refrigerant to pass through; they are pressure expansion valve, capillary tube, and thermal expansion valve. Students can use the control panel to switch the preferred expanding path from three expansion devices and compare the corresponding performance under Refrigeration or Heat Pump cycle.

The state of the refrigerant can be clearly observed through 6 sight glasses at different phases of the Refrigeration / Heat Pump cycle. 5 hand valves are used to manually control the flowing direction of the refrigerant circulating through the system. Student must use the valves to lead the refrigerant to the appropriate flowing direction so that the system can operate in corresponding cooling / heating condition. If students mislead the refrigerant to wrong flowing direction, the pressure protection switches will detect the conflict and halt the compressor to prevent the system from being damaged.

Features

- All system components, including condenser, compressor, evaporator, capillary tube, filter, refrigerant receiver, accumulator, hand valves, pressure gauges, expansion devices, are mounted on the front panel for direct operation and observation
- Use control panel to select heat pump cycle (cooling or heating), fan speed of evaporator and condenser, and expanding path of the refrigerant
- Use control box to monitor the system voltage and current as well as heat pump status.
- Provide three types of expansion devices, including capillary tube, pressure expansion valve, and thermal expansion valve for refrigerant to pass through.
- Provide 6 sight glasses to observe the refrigerant status before and after passing evaporator, condenser, expansion devices, and compressor.
- Provide 5 hand valves to control the flowing direction of the refrigerant.
- Provide high and low pressure protection switches to automatically halt the compressor when detecting wrong refrigerant flowing path.
- The refrigerant path for high pressure tube is painted in red and low pressure tube in blue.

Specifications

1. Compressor : 1HP 220VAC 50/60Hz
2. Refrigerants : R-134a
3. High pressure gauge(0~500psig) and low pressure gauge(0~200psig)
4. Capillary tube
5. Pressure expansion valve
6. Thermal expansion valve (-40~+10˚C Cap. Tube 1.5m)
7. 4-Way valve 220VAC Max 2.5Mpa Min 0.25Mpa discharge 3/8" suction & coils 5/16"
8. High pressure switch 110~430psig with manual reset
9. Low pressure switch 0~80psig with manual reset
10. Refrigerant receiver
11. Refrigeration accumulator
12. 6 Sight glasses
13. 5 Hand valves
14. 4 Solenoid valves
15. Forced fan 220VAC 50/60Hz
16. Dimension 1600(W)x580(D)x1890(H)mm(±10%)
17. Accessories sets

Electric Box

1. Breaker 220VAC 20A
2. Ammeter 0~20A and voltmeter 0~300V
3. 4 Way switch
4. Condenser and evaporator 4 range fan switch
5. Solenoid valve switch
6. Compressor power

Experiments

1. Refrigeration circulation system with capillary tube
2. Refrigeration circulation system with pressure expansion control valve
3. Refrigeration circulation system with thermal expansion control valve
4. Reverse cycle heat pump system
5. Reverse cycle heat pump system without refrigerant receiver
6. Drawing Mollier Chart
7. Calculating system performance
8. Comparison of system performance
9. Comparison of energy between cooling and heating experiments
10. Coefficient of performance (COP) and energy efficiency ratio (EER)

Optional but Necessary

1. R-134a refrigerant
2. Vacuum pump