

Experimental Study of the Dynamic Behavior of Thermostatic Expansion Valve

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ABSTRACT: Thermostatic expansion valves (TXVs) are widely used in heat pump systems to control the liquid refrigerant supply to the evaporator based on the degree of superheat at the exit. Since it is the main component for controlling the refrigerant flow, the dynamic behavior of the TXV is important for the dynamic control and simulation of the heat pump system.

In this paper, a dynamic model of TXV is presented. Simulation of the mechanical elements are based on the technical data provided by the valve manufacturer. Method to experimentally determine the dynamic characteristics of a temperature bulb sensor of TXV has also been proposed. The model which uses the proposed parameters represents the responses of the experimental and the simulation data well. In addition, four methods of installing the temperature bulb sensor to the evaporator outlet tube were experimentally studied. From the experiment conducted under standard cooling condition, the error of the measured temperature varies from 4.0% to 40.7%. The tube-bulb system with the installation band and the insulation showed the best accuracy.

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