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Electronic expansion valve for household and similar air conditioner

家用和类似用途空调电子膨胀阀

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Foreword

This Standard was drafted in accordance with the basic principle of direct-acting electronic expansion valve, with reference to technical information of advanced countries.

This Standard was proposed by China Machinery Industry Federation.

This Standard shall be under the jurisdiction of National Technical Committee on Automatic Controllers of Standardization Administration of China.

The drafting organizations of this Standard: Zhejiang Sanhua Group Co., Ltd., Jiangsu Chang Heng Group, Foshan Huaying Refrigeration Equipment Co., Ltd., Zhejiang Chunhui Group, Guangzhou Institute of Electrical Science.

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Electronic expansion valve for household and similar air conditioner

1 Scope

This Standard specifies the terms and definitions, model, requirements, test methods, inspection rules and marks, packaging, transport and storage of electronic expansion valve for household and similar air conditioner.

This Standard applies to direct-acting electronic expansion valve of which the rated voltage is not greater than 36V, the valve diameter is not more than 4mm, R22 is used as refrigerant (hereinafter referred to as the value). The electronic expansion valve that takes R406C, R410A as refrigerants shall refer to this for implementation.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrigendum) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 191, *Packaging and storage marks*

GB/T 2423.1, *Environmental testing for electric and electronic and electronic products - Part 2: Test methods - Tests A: Cold*

GB/T 2423.2, *Environmental testing for electric and electronic products - Part 2: Test methods - Tests B: Dry heat*

GB/T 2423.3, *Environmental testing for electric and electronic products - Part 2: Testing method test Cab: Damp heat Steady state*

GB/T 2423.10, *Environmental testing for electric and electronic products - Part 2: Tests methods - Test Fc: Vibration (sinusoidal)*

GB/T 2423.22, *Environmental testing - Part 2: Tests methods - Test N: Change of temperature*

GB/T 10125, *Corrosion tests in artificial atmospheres - Salt spray tests*

5.2.11 Electrical strength

The valve coil lead and valve body can withstand AC 500V, 1min and AC 600V, 1s electrical strength test, no breakdown or flashover phenomenon (set the leakage current value as 5mA).

5.2.12 Pulse resistance voltage

After the valve withstands 1/40 μs wave, 5kV peak voltage, five consecutive pulse voltage tests, it can still meet the requirements of 5.2.10 and 5.2.11.

5.2.13 Noise

The noise is not greater than 45dB (A).

5.2.14 Coil temperature rise

The coil temperature rise is not greater than 60K.

5.2.15 High temperature resistance

The valve can still meet the requirements of 5.2.3, 5.2.6, 5.2.7, 5.2.9 and 5.2.10, 5.2.11 after it is subjected to the high temperature test of 80°C, 72h.

5.2.16 Low temperature resistance

The valve can still meet the requirements of 5.2.3, 5.2.6, 5.2.7, 5.2.9 and 5.2.10, 5.2.11 after it is subjected to the low temperature test of -30°C, 72h.

5.2.17 Temperature resistance change

The valve withstands -30°C, 1h, 80°C, 1h as a cycle. It shall also meet the requirements of 5.2.3, 5.2.6, 5.2.7, 5.2.9, 5.2.10, 5.2.11 and 5.2.13 after five cycles of temperature change test.

5.2.18 Moist heat resistance

After the valve withstands 48h moist heat test, it shall also meet the requirements of 5.2.10 and 5.2.11.

5.2.19 Vibration resistance

After the valve is subjected to the vibration test, it shall also meet the requirements of 5.2.3, 5.2.6, 5.2.7 and 5.2.8.

5.2.20 Corrosion resistance

After the valve withstands 72h corrosion test, it shall also meet the requirements of 5.2.3, 5.2.10 and 5.2.11.

electromagnetic valve; 7-testing valve; 8-flow meter.

Figure 5

6.2.9 Valve leakage test

Connect as Figure 1. Turn off the valve. Then apply 1.0MPa of air pressure at the valve inlet (the pressure is acting on the valve at the off direction). Apply atmospheric pressure to the exit end. Measure the air leakage at the outlet, in accordance with the requirements of 5.2.9.

6.2.10 Insulation resistance test

Use a DC 500V megger to measure the insulation resistance between the lead and the valve body, in accordance with the requirements of 5.2.10.

6.2.11 Electrical strength test

Apply DC 500V, 1min or DC 600V, 1s between the lead and the valve body, in accordance with the requirements of 5.2.11.

6.2.12 Impulse voltage resistance test

Apply 1/40μs wave between the lead and the valve body. The peak voltage is 5kV. After 5 consecutive impacts, it shall meet the requirements of 5.2.12.

6.2.13 Noise test

Hang the valve in the air. At the rated voltage, in the specified excitation method, at the excitation speed and under the number of pulses in the control range, perform the on-off cycle. Measure the noises at 6 points up and down, left and right, front and back, 300mm from the motor surface, in accordance with the requirements of 5.2.13.

6.2.14 Coil temperature rise test

Place the valve in a 40°C ± 2°C thermostat. And connect the measurement and control circuits. After 2h temperature equilibrium, measure and record the initial resistance of the coil. Then connect the valve to 110% of the rated voltage. In the specified excitation method, at the excitation speed, within the valve-on scope of the number of pulse specified by pattern, perform consecutive on-off cycles for 2h. Then measure the resistance of the coil. Use the resistance method to measure the temperature rise of the coil, as calculated according to the following equation:

$$\Delta t = \frac{(R_2 - R_1)}{R_1}(234.5 + t_1) + t_1 - t_2$$

where,

Δt - coil temperature rise value, in K;

t_1 - ambient temperature at the beginning of the test, in °C;

t_2 - final ambient temperature of test, in °C;

R_1 - coil resistance at temperature t_1, in Ω;

R_2 - coil resistance at temperature t_2, in Ω.

The coil temperature rise shall be in accordance with the requirements of 5.2.14.

6.2.15 High temperature resistance test

In the absence of electricity conditions, carry out the high temperature test of which the temperature is 80°C, the time is 72h, according to the provisions of GB/T 2423.2. Take the valve out and let it recover at room temperature for 2h. It shall meet the requirements of 5.2.15.

6.2.16 Low temperature resistance test

In the absence of electricity conditions, carry out the low temperature test of which the temperature is -30°C, the time is 72h, according to the provisions of GB/T 2423.1. Take the valve out and let it recover at room temperature for 2h. It shall meet the requirements of 5.2.16.

6.2.17 Temperature change resistance test

In the absence of electricity conditions, carry out 5 cycles of temperature change tests of which one cycle consists of -30°C, 1h, 80°C, 1h. Take the valve out and let it recover at room temperature for 2h. It shall meet the requirements of 5.2.17.

6.2.18 Moist heat resistance test

In the absence of electricity conditions, according to the provisions of GB/T 2423.3, after the 48h moisture heat test, the valve shall meet the requirements of 5.2.18.

6.2.19 Vibration resistance test

Turn on the valve to the specified pulse, make the valve vibrate at 33Hz full amplitude 2mm, according to the provisions of GB/T 2423.10. Vibrate at directions of X, Y, Z respectively for 2h with vibration testing machine, in accordance with the requirements of 5.2.19.

6.2.20 Corrosion resistance test

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