NTC Thermistor – Inrush Current Limiting Devices

Application Instruction

Inrush current limiter

In electronic circuit which contains capacitors, filament bulbs, fluorescent lamp inverters and heaters, etc., will generate a inrush current with several ten times beyond the steady state current when it switch on. The zero-power resistance value of NTC is useful to suppress the inrush current and keep the circuit work stable.
A typical application of ICL devices(Fig. A)
The indicated in Fig. B is illustrates the ICL (Inrush Current Limiting) function.

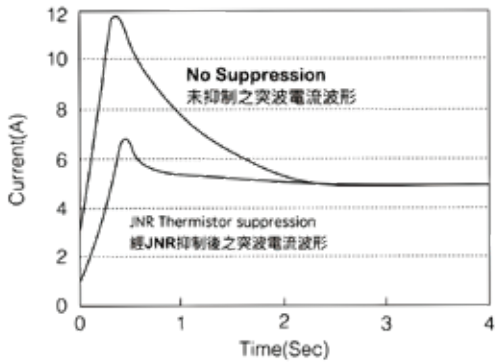

Fig A

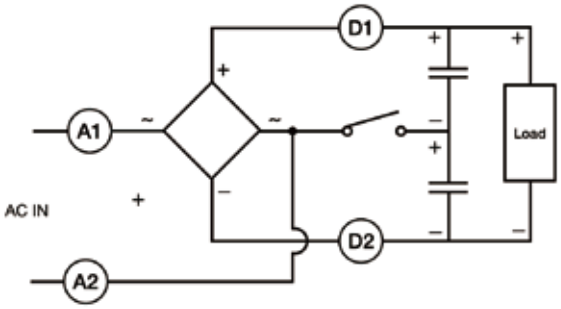

Fig B

NTC Parameter Definition

Rated Zero-Power Resistance (R25)

The resistance value measured at 25 ℃ ambient temperature.

Material constant (β)

The comparison value of the resistances of a thermistor at a certain temperature and an other different temperature, it's calculated by the following formula and expressed in terms of the degrees Kelvin.

$$\beta = Ln(R1/R2)/(1/T1-1/T2)$$

T1=298.15°K(+25℃), T2=358.15°K(+85℃) for B25/85
T1=298.15°K(+25℃), T2=323.15°K(+50℃) for B25/50

Maximum steady-state current (Imax.)

(For JNR series only)

The maximum steady-state current is the rating of the maximum current, normally expressed in amperes(A), allowable to be conducted by an inrush limiting NTC Thermistor for an extended period of time.

Resistance at maximum current (RImax.)

(For JNR series only)

The resistance at maximum current is the approximate resistance of an inrush current limiting thermistor, expressed in ohms(Ω), when it is conducting its rated maximum steady-state current.

Maximum Load Capacitance @AC240V

(For JNR series only)

The maximum capacitance is the maximum allowable capacitance of JNR series in power supply applications. This capacitance refers to the filter capacitance at the back end of the bridge rectifier. Generally, the recommended value of the JNR series should be greater than the value of the filter capacitance in the circuit

Maximum Rated Power Consumption (Pmax.)

The maximum rated power consumption is the maximum power rating applied to the thermistor continuously at 25℃ ambient temperature or the specified temperature in the specification. When the working temperature is below 0℃ or over 25℃, the rating power should be decreased. (see Fig. C)

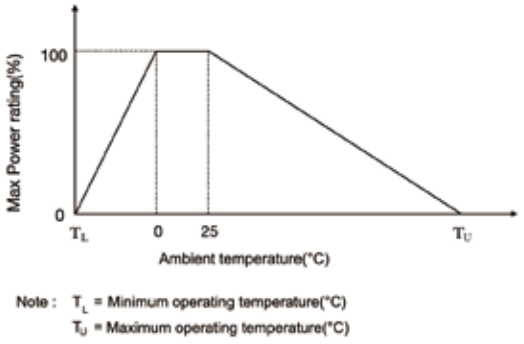

Fig C

For example：

Ambient temperature(Ta)=55℃

Maximum operating temperature(Tu)=200℃

P Ta =(Tu-Ta)/(Tu-25)×Pmax=82% Pmax

Thermal dissipation coefficient (δ)

The thermal dissipation coefficient is ratio, it is expressed in mW/°C, at a specified ambient temperature, of a change in power dissipation in a thermistor to the resultant body temperature change. (It can be expressed by the formula: $\delta=V^*I/\Delta T$)

Thermal time constant (τ)

The thermal time constant is the time required for a thermistor to reach 63.2% of the difference between its initial and final body temperature when subjected to a step function change in ambient temperature under zero-power condition and is normally expressed in second. (See Fig.D)

Remark: the smaller the product volume is, the smaller the heat capacity and the faster the response.

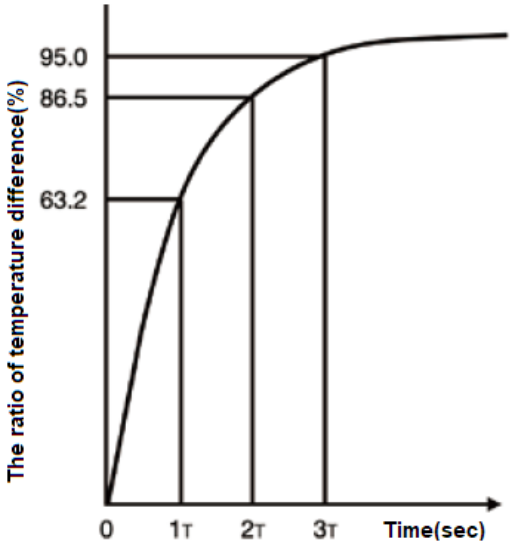

Fig D

Operating temperature range

Ambient temperature range for thermistor's continuous operate at zero rated power.

The defined maximum and minimum operating temperatures are specified in each series.