■ Degaussing

1. Brief of product

PTC thermistors degauss the shadow mask of color picture tubes by reducing the alternating current flowing through the degaussing coil within a short period of time. A large difference between inrush current and residual current is crucial for good degaussing (see Fig. 7) Thinking provides varied PTCs for degaussing purposes. Particularly, in a double PTC, a PTC connected to the coil, as compared to a single PTC, this configuration permits the residual current to reduce further (see Fig. 8).

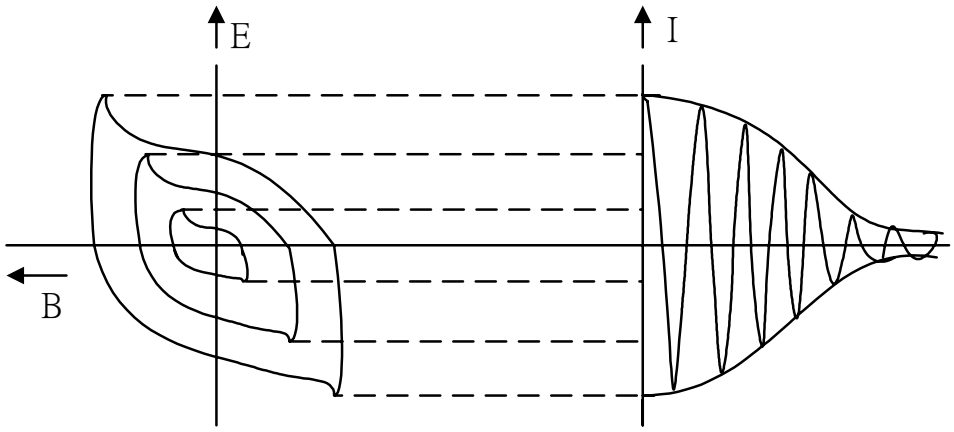


Fig. 7 Cardinal principle of degaussing

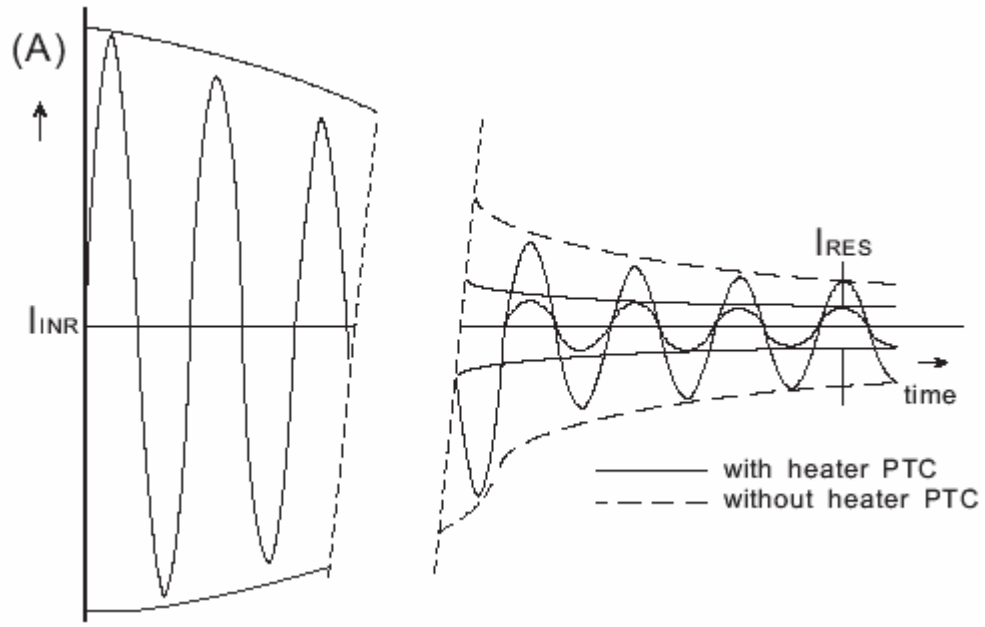


Fig. 8 By using a dual PTC thermistor,
I_{RES} is significantly reduced.

2. Main Parameter

a、Rated zero-power resistance and it's tolerance

b、Rated voltage (V_R)

c、Maximum voltage (V_{max})

d、Characteristic of current decay

d.1、Starting current (I_0，inrush current)

d.2、Residual current after 1 second. Residual current after 3 second (I_1、I_3)

d.3、Residual current

3. Circuit of typical application

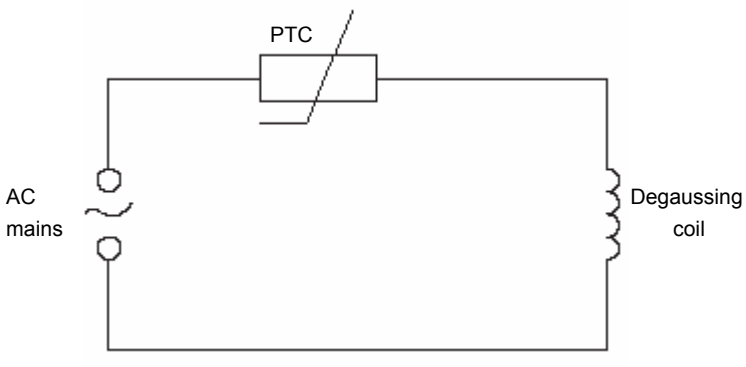
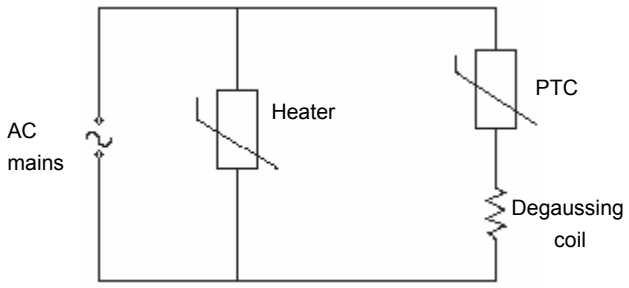


Fig. 9-1 Mono PTC arrangement



9-2 Mono PTC + Heater arrangement

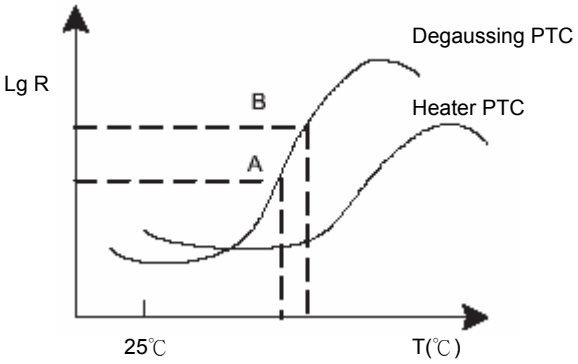


Fig. 10 R-T(Dual PTC arrangement)

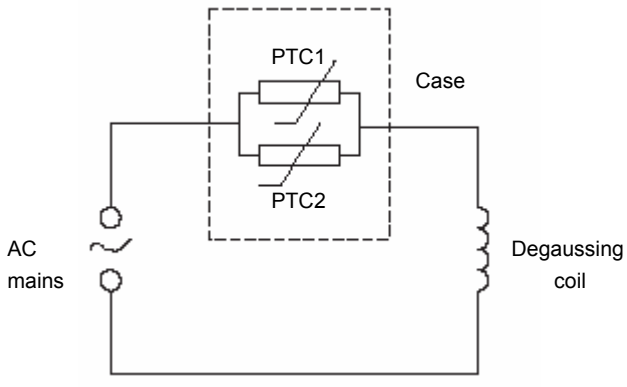


Fig. 11 Dual PTC arrangement
(Dual degaussing disc)

■ Motor Starting

1. Brief of product

In starter circuit for single-phase a.c. motors, the PTC thermistor is used for delaying the switch-off of the starter auxiliary winding (after the motor has accelerated) to protect the winding from damage. (see Fig. 12). A wide range of types including some encased models is available for motor starting applications

2. Main parameter

a、Resistance and it's tolerance

b、Maximum voltage (V_{max})

c、Operating time (t_0)

d、Equilibrium power (p)

e、Recovery time (t_r)

3. Circuit for typical application

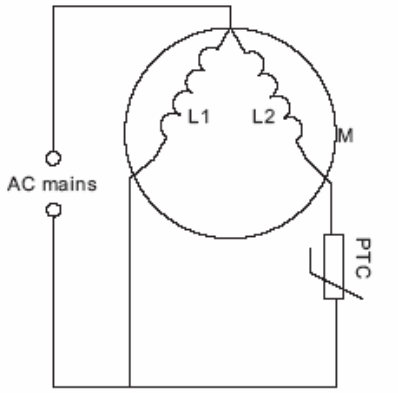


Fig.12 Circuit for motor starting

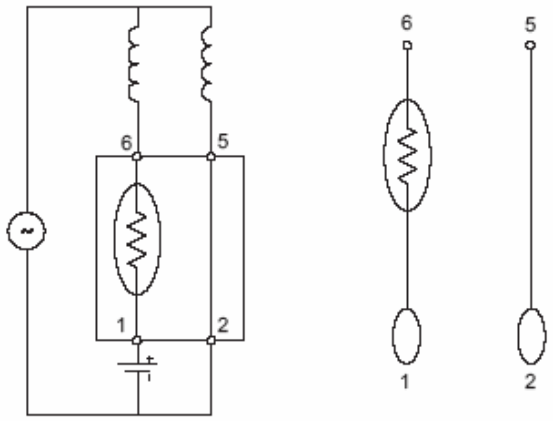


Fig.13 0:CSIR TYPE
Capacitor-start motor

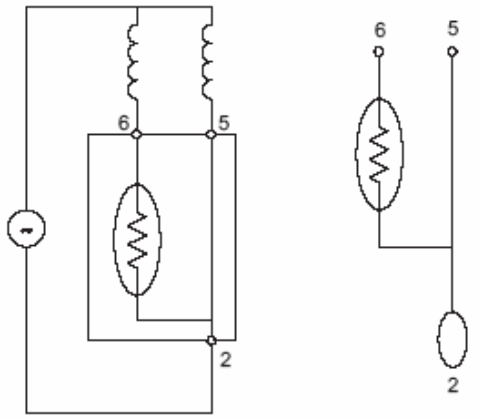


Fig.14 1:RSIR TYPE
Resistance-split-phase start motor

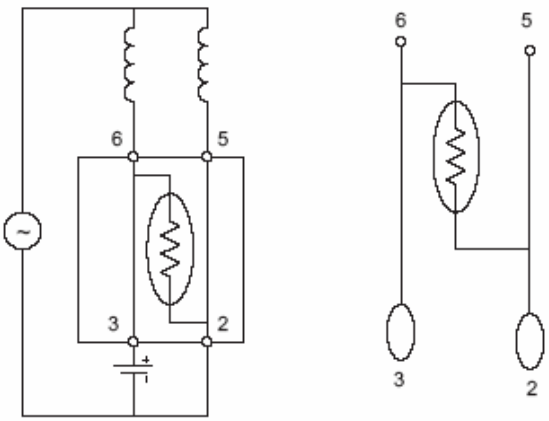


Fig.15 2:RSCR TYPE
Capacitor-drive

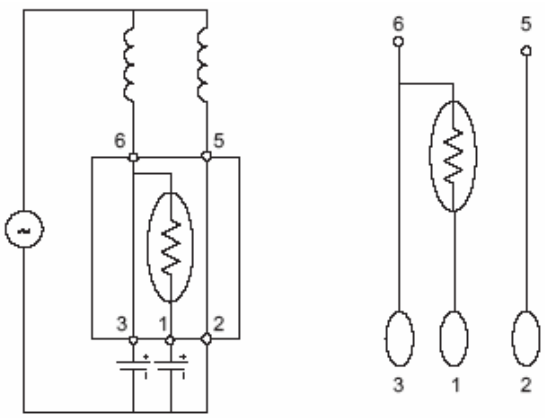


Fig.16 3:CSR TYPE
Capacitor-start-drive

■ Switching

1. Brief of product

When the rectified mains is first applied, the PTC thermistor is cold, so its resistance is low. The lamp voltage will be below the necessary ignition value, so the current will flow through the cathodes, heating them to their emission temperature, where upon the resistance of PTC thermistor will rise rapidly, allowing the lamp voltage to reach its ignition value and light the lamp. Once the lamp is lit, the cathodes are fed by a high-frequency (20~40 KHz) lamp supply, to avoid flicker, via two power FET switches; The PTC thermistor plays no further part until the lamp is switched off whereupon it is ready to resume its smooth-starting function.

2. Main parameter

a、Resistance at 25℃(R_{25})

b、Switch temperature (T_C)

c、Maximum current (I_{max})

d、Maximum voltage (V_{max})

e、Dimension (phi)

3. Circuit for typical application

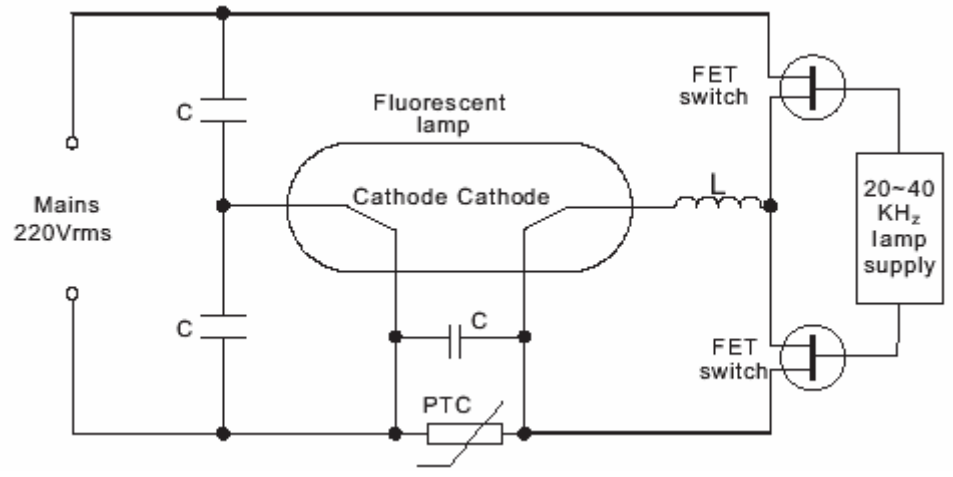


Fig. 17 Typical electronic ballast circuit

■ Heating

1. Brief of product

The product is provided with automatic constant temperature. It can be widely used for warming, drying of cloth or tableware and air conditioner's supplementary instrument of heating.

2. Main parameter

a、Rated Zero-power resistance (R_{25})

b、Rated voltage (V_R)

c、Switch temperature (T_C)

d、Structure shape

3. Circuit for typical application

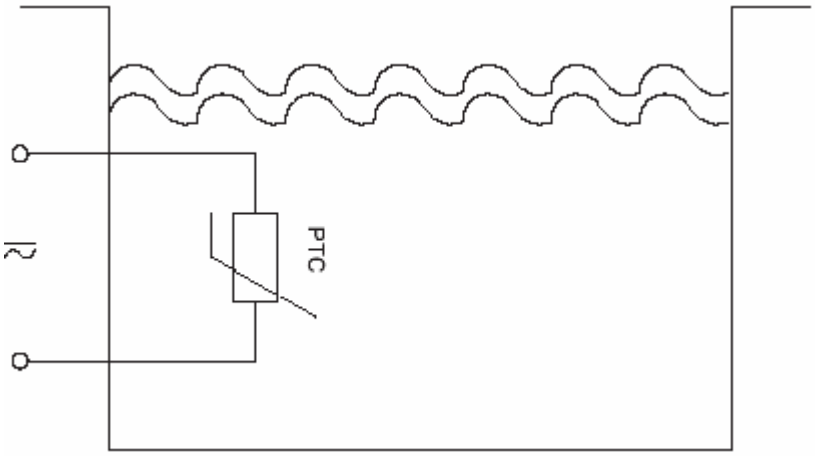


Fig. 18 Thermostatically controlled heating circuit

■ Overload Protection

1. Brief of product

Ceramic PTC thermistors are used instead of conventional fuses to protect loads such as motors, transformers, etc, or electronic circuit against overload. They not only respond to inadmissible high currents, but also respond if a preset temperature limit is exceeded. Thermistor fuses limit the power dissipation of the overall circuit by increasing their resistance and thus reducing the current to a harmless residual value. In conventional fusing, they do not have to be replaced after fuse, but PTC thermistors resume their protective function immediately after a short cooling-down time.

2. Main parameter

a、Structure shape (disc, lead)

b、Non-tripping current (normal operating current，I_{nt})

c、Tripping current (abnormal current，I_t)

d、Maximum current (I_{max})

e、Maximum voltage (V_{max})

f、Maximum operating temperature scope

3. Curve of characteristics

The relationship between current and the ambient are described in Fig. 19

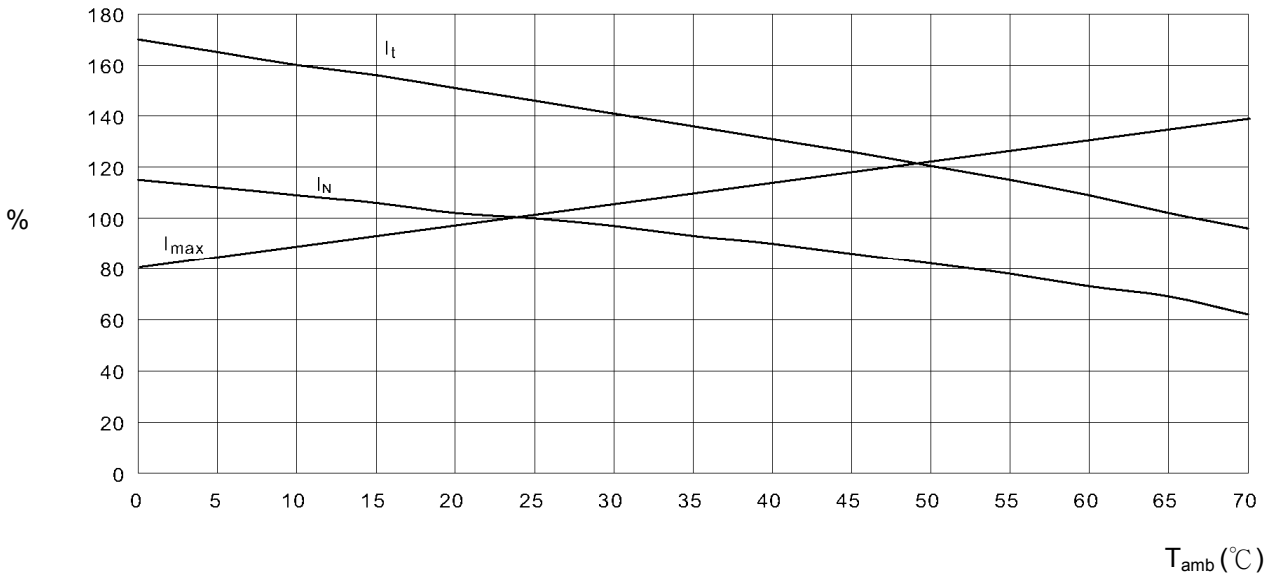


Fig. 19 Current deviation as a function of the ambient temperature

4. Type of protection

In normal, There are three overload possibilities:

a) Over current (see Fig. 20), the load current increases due to a decrease in load resistance. Example when transformer winding short-circuit.

b) Over voltage (see Fig. 21), the load current increases due to a increase in voltage. Example, the 380V mains is accidentally applied to a 220V mains.

c) Over temperature (see Fig. 22), where the PTC thermistors with an overheating ambient temperature (T_{amb2}), so the PTC thermistors need less internal heat to reach its switch point P, so P1 moves below load-line CD.

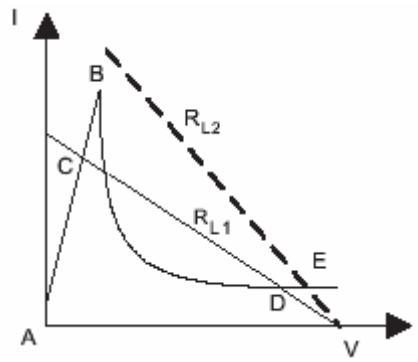


Fig.20 Overcurrent protection

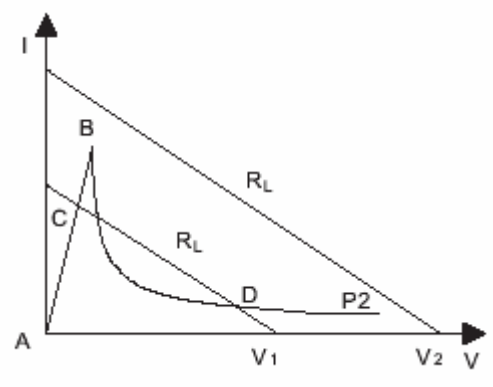


Fig.21 Overvoltage protection

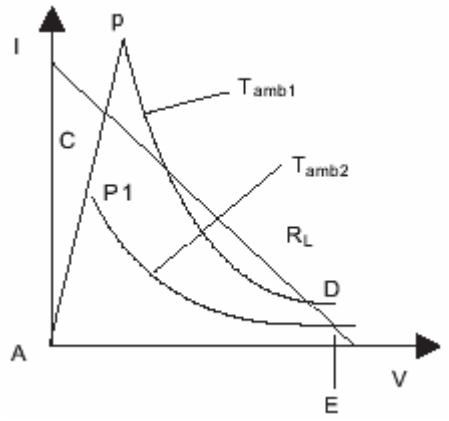


Fig.22 Over-temperature protection

5. Application example

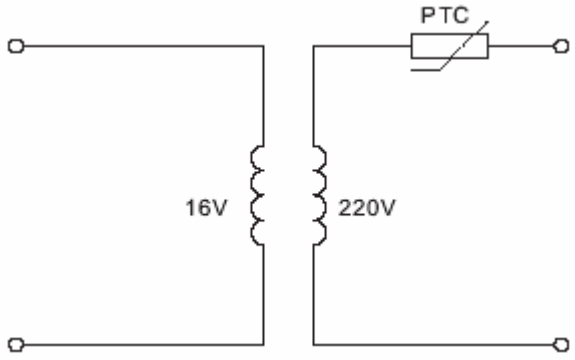


Fig.23 Circuit for protecting a transformer (Primary side)

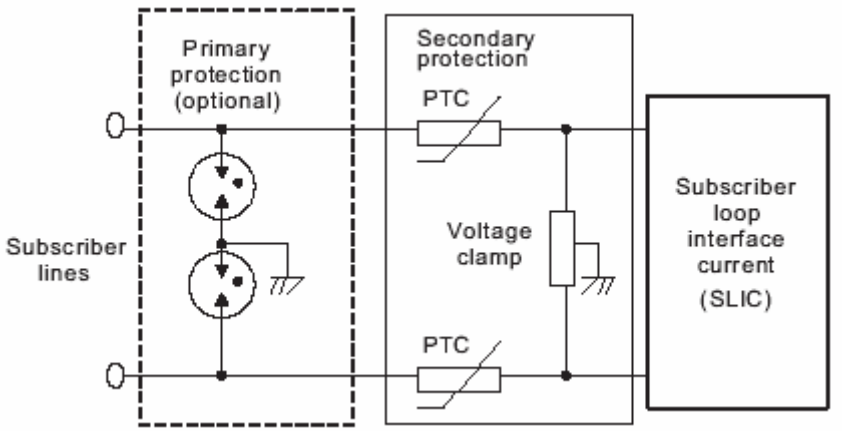


Fig.24 Typical telephone line equipment showing where PTC thermistors can be used for overcurrent protection

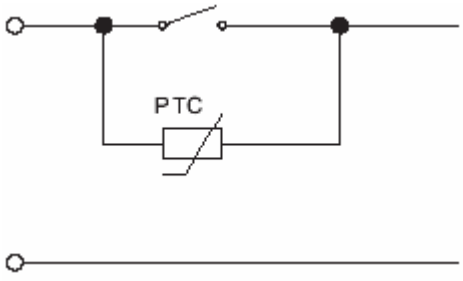


Fig.25 Spark suppression circuit

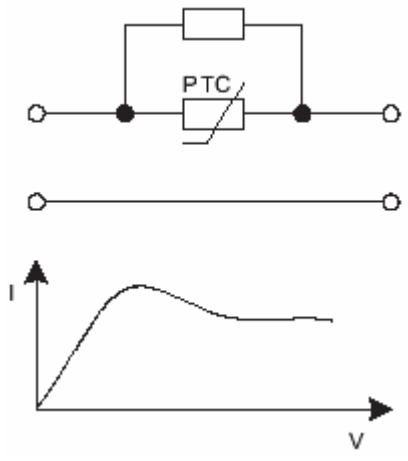


Fig.26 Current stabilization

■ Temperature Sensor

1. Brief of product

The resistance prevails on high resistance or lower resistance by the change of ambient temperature, opening the return circuit by clear change of resistance. It can avoid damage and protect the element. The characteristics are various of control temperature and satisfied with different demand.

2. Main parameter

a、Temperature of sensor (T_S)

b、Resistor of temperature at $T_{S+5℃}$ ($R_{TS+5℃}$,Min.)

c、Resistor of temperature at $T_{S-5℃}$ ($R_{TS-5℃}$,Max.)

d、Resistor of temperature at 25℃ (R_{25})

e、Maximum operating voltage (V_{max})

3. Principle of temperature sensor

The PTC thermistor is connected into the bridge arm of a comparator circuit (see Fig. 27). At normal temperature, PTC thermistor resistance (R_p) is lower than R_s, so the comparator's output voltage will be low. When over temperature occurs, the PTC thermistor will quickly heat up to its switch temperature, its resistance will be higher than R_s , causing V_o to increase to a level sufficient to activate a trip (see Fig.28).

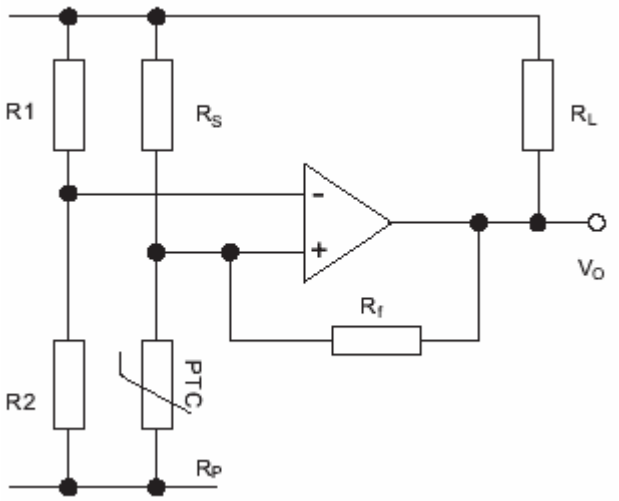


Fig.27 Typical comparator circuit

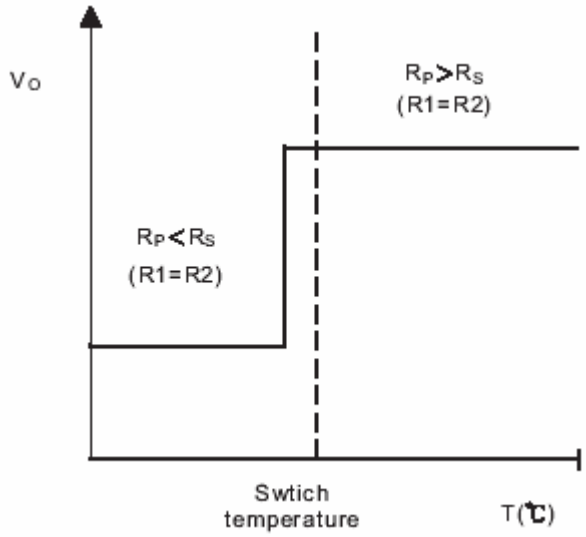


Fig.28 Typical switch characteristic

4. Circuit for application typical

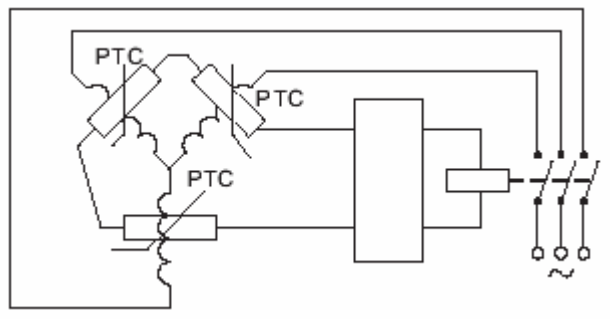


Fig.29 Temperature protection of electric motors

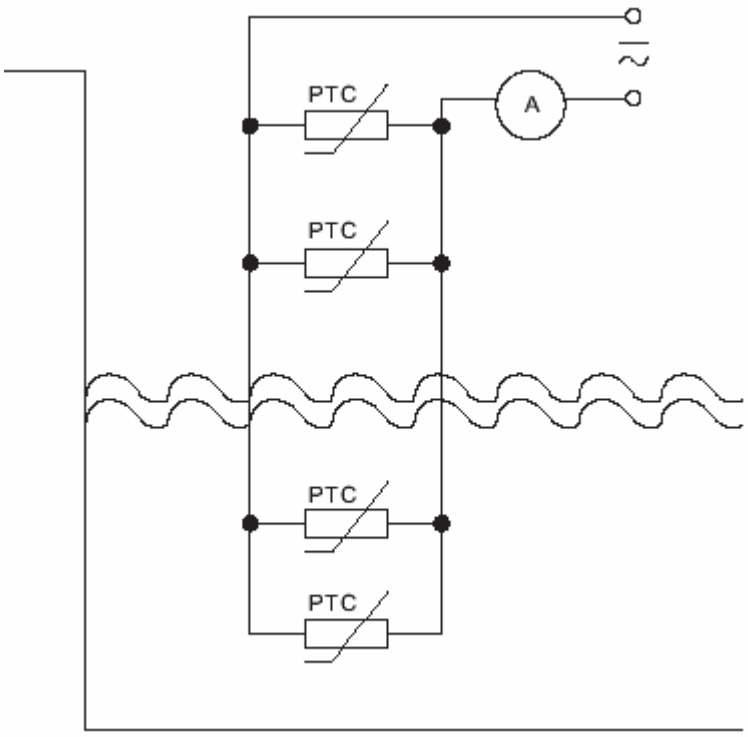


Fig.30 Liquid-level indication

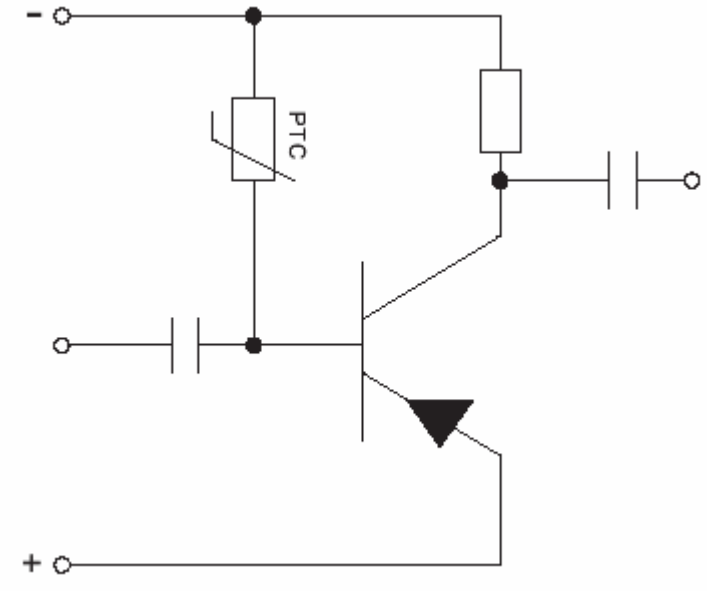


Fig.31 Temperature compensation of transistor circuits

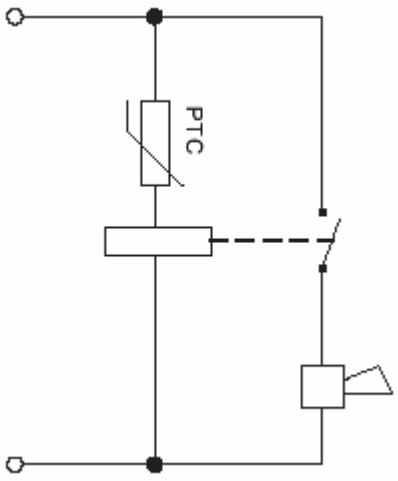


Fig.32 Alarm installation