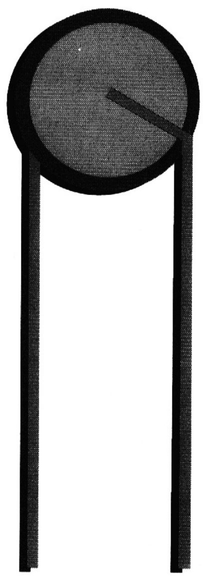

PTC THERMISTOR SERIES

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maida

INTRODUCTION

The Positive Temperature Coefficient (PTC) thermistors are semiconducting ceramic devices that switch from a low resistive state to a high resistive state at a designed temperature. PTC's are used to protect sensitive components from over current conditions.

Applications

- Over Current Protection
- Liquid Level and Air Flow
- Over Temperature Protection
- Electric Motor Starting
- Arc Suppression
- Degaussing

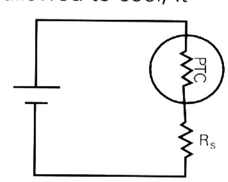
Features

- Fast switching
- No electrical noise
- Unlimited life
- Self resetting
- No contacts
- Automatic Operation

Applications

Over-Current Protection

A PTC thermistor can be used in the circuit below as an over current protector, sometimes referred to as a resettable fuse. The thermistor is carefully selected so that under normal operating conditions, the current drawn by the load is not high enough to cause the thermistor to self heat. However, if an overload condition should occur, the current though the thermistor rises to a level sufficient to joule heat to the switching temperature. When the overload condition has been removed, and the thermistor allowed to cool, it resets to its low resistance state.



Liquid Level and Air Flow

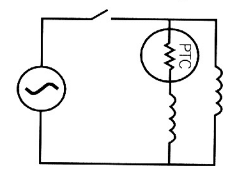
Ceramic PTC thermistors can behave as liquid level or airflow sensors with the PTC in series with a relay coil, Rs, also shown in the circuit above. In both cases, the power dissipated in the thermistor is sufficient to significantly increase its temperature. When sensing liquid levels the thermistor temperature drops when submerged in a liquid due to the change in dissipation constant. The resistance then decreases and the relay coil is energized, causing the tank value to close. The thermistor and circuit parameters must be chosen such that the resistance change is great enough to prevent relay chatter. A similar circuit involves the change in dissipation constant due to the motion of air surrounding the PTC thermistor.

Over Temperature Protection

This application is very similar to over current protection and its circuit diagram is also shown above. In this type of circuit the load resistance is a device that has the potential of overheating and the thermistor is placed in close thermal contact with the load. If the load should begin to "run away." the thermistor will switch to its high resistance state and open the circuit. This circuit is fail safe since both an open circuit and a short circuit would appear as an over temperature condition.

Electric Motor Starting

Many single phase electric motors use starter windings with a manual switch. This switch can be inconvenient or impossible to use in some situations. The circuit diagram below shows the use of a PTC thermistor in series with the starter winding of an electric motor. When the motor is started, the PTC switches to its high resistance state due to joule heating and the current through the starter winding is decreased to a very low level.



Arc Suppression

Inductive loads, such as motors or electromagnets, can cause arcing across the switch when opened. This is due to the tendency of current through an inductor to remain constant. After the switch is closed and the current ramped up, the switch can be opened and the current will run through the thermistor; which will initially be in its low resistance state. Once the thermistor becomes hot and switches to its high resistance state, the current will drop to an insignificant level and essentially all of the supply voltage will be dropped across the thermistor.

Degaussing

Color television sets and computer CRT's contain a demagnetization coil for automatic degaussing when the power is initially turned on. The circuit consists of a series connection of a PTC thermistor and the coil placed across the power line. The low initial resistance of the PTC allows a large inrush of current, and once the PTC heat up the coil current is reduced to very low levels. The time required for the PTC to switch depends upon the power dissipated by the thermistor, and upon its thermal mass.

PTC Thermistor Style Designation

(A)__ (__) PTC ___ A ___ ___

1. **Coating Designation** (optional)
   - D - Standard Epoxy Coating
   - H - High Temperature Silicone coating
   - No code - No coating
2. **Bare Disk Diameter**

59 - 0.188″	58 - 0.219″
60 - 0.250″	73 - 0.281″
68 - 0.313″	61 - 0.375″
71 - 0.438″	62 - 0.500″
69 - 0.563″	64 - 0.625″
63 - 0.688″	67 - 0.750″
65 - 0.813″	76 - 0.875″
66 - 1.000″	70 - 1.250″

3. **Lead Configuration** (optional)
   - 10 - Inside Kink, 20AWG
   - 11 - Outside Kink, 20AWG
   - 31 - Straight Leads, uncoated
   - 96 - Inside Kink, 18AWG
   - 97 - Outside Kink, 18AWG
   - Other lead configurations available upon request
4. **Resistance Code**, two significant figures and a one digit multiplier (see Multiplier Code Table)
5. **Tolerance Code** (see Tolerance Code Table)
6. **Switch Temperature** (°C)
7. **Maximum Voltage**, DC or RMS, two significant figures and a one digit multiplier (see Multiplier Code Table)

Multiplier Code Table

0	1	2	3	4	5	6	7	8	9
10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^{-2}	10^{-1}

Tolerance Code Table

F	G	H	J	K	L	M	N	Q
±1%	±2%	±3%	±5%	±10%	±15%	±20%	±25%	±30%

How to Order the PTC Thermistor Series

The following specification table provides a way to match the Maida style number to a thermistor that provides the necessary specifications for a specific application. Once the general style number is obtained, it will be necessary to determine the required lead configuration. Refer to the lead configuration table and add the required code to the Maida style number when ordering. Some custom lead configurations are available. Contact our engineering department for additional information.

The PTC Thermistors are available in bulk, ammo pack, and tape and reel packaging. Contact our engineering department for additional information.

SPECIFICATIONS

Electrical Characteristics

Maida Style #	Maximum Voltage	R @ 25°C	Maximum No Switch Current	Minimum Must Switch Current	Heat Capacity	Dissipation Constant
	Volts	Ohms	Amps	Amps	Watt-sec °C	Watt °C
6431PTC808M120150	15	0.8	0.89	1.58	0.57	15
6931PTC109M120150	15	1	0.77	1.37	0.48	14
6231PTC159M120150	15	1.5	0.56	0.99	0.32	11
7131PTC209M120150	15	2	0.46	0.82	0.25	10
6431PTC509M120500	50	5	0.36	0.63	0.85	15
7131PTC100M120590	50	10	0.21	0.37	0.38	10
6831PTC200M120500	50	20	0.13	0.23	0.21	8
6431PTC709M120131	132	7	0.31	0.55	1.41	18
6931PTC100M120131	132	10	0.25	0.45	1.19	15
6131PTC250M120131	132	25	0.13	0.23	0.48	10
6031PTC500M120131	132	50	0.08	0.15	0.25	8
5831PTC101M120131	132	100	0.05	0.1	0.16	7
7131PTC250M120261	265	25	0.14	0.25	0.94	12
6831PTC500M120261	265	50	0.09	0.16	0.53	9
5831PTC101M120261	265	100	0.06	0.1	0.24	8
6131PTC500M120401	400	50	0.1	0.18	0.96	12
6031PTC101M120401	300	100	0.06	0.1	0.49	9

Maximum Voltage listed a either DC or 60 Hz AC

Physical Dimensions

Maximum Diameter	Lead Diameter
Inches	Inches
0.650	0.032
0.600	0.032
0.500	0.025
0.450	0.025
0.650	0.032
0.450	0.025
0.350	0.025
0.650	0.032
0.600	0.032
0.400	0.025
0.300	0.025
0.250	0.025
0.450	0.025
0.350	0.025
0.250	0.025
0.400	0.025
0.300	0.025

*lead spacings 0.300" standard, 0.200" and 0.250" available upon request.

*The Maximum No Switch Temperature is the maximum amount of current that the device can carry without switching to its high resistance state. This parameter is determined at the maximum ambient temperature of 50°C.

*The Minimum Must Switch Temperature is the minimum amount of current required to Switch the device into its high resistance state. This parameter is determined at the minimum ambient temperature of 0°C.