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Portage Electric Products, Inc.
Thermal Control Specialists

Glossary of Commonly Used Terms Associated with Thermal Controls

Ambient Temperature: The typical temperature measured of the environment of an application during normal operating conditions.

Automatic Reset: A term used for thermal controls which automatically resets to their normal contact configuration which has been preset at the factory.

Axial Termination: This term is used to describe the actual configuration where the terminals of connecting lead wires are attached to a thermal control device. Axial termination has leads that are connected from opposing ends (opposite end termination).

Bimetal: Bimetal is made from specially bonded materials that react differently under the influence of a thermal load. The principle behind how bimetals work makes use of the fact that different metals will expand or contract at different rates when heated or cooled. This is commonly referred to the coefficient of expansion. The materials which are used to produce bimetal react differently when heat is induced into the bimetal element either through exposure to heat generated by an application or caused by the self-heating effect created by passing current through the bimetallic element, or a combination of both. This permits the bimetallic element to "bend" or “flex” creating the work force required to make or break an electrical circuit.

Calibration Temperature: The nominal operating temperature setting for thermal controls. This is equivalent to an average operating temperature which is requested by individual customers for their application.

Calibration Tolerance: The amount of acceptable temperature variance above and below the nominal “Calibration Temperature.” This is typically expressed in terms of “plus or minus.”

Cantilever Control: A term used for a thermal control where a single bimetal element carries the circuit current of the application.

Contact Resistance: A term used to define the characteristics of the materials used in a thermal control which impedes the flow of electricity through the components. In many applications, a lower total resistive value of a thermal control improves the performance in the end product.

Creep Action Control: Basically creep action devices get their name from the movement of the bimetallic element used in this construction type. A creep action device utilizes a single bimetal element which either will open or close an electrical circuit based on increases in temperature and or current. The bimetallic element is produced so that there is little or no temperature differential between the opening and closing point of the devices.

Current Derating: A term used to describe the effects on a thermal control when increased current is applied causing the device to react (open) at a temperature below its preset operating

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temperature. The effects of current derating only pertain to thermal control devices where the bimetal element carries the circuit current.

Differential (Hysteresis): This term refers to the difference between the opening and reset temperatures for a thermal control.

> **Nominal Differential:** A term used to describe the actual amount of temperature variance between the nominal open and nominal close temperatures of a thermal control.
>
> **Apparent Differential:** The nominal differential of a thermal control combined with influences of temperature variations experienced in an actual application.
>
> **Maximum Differential:** This term is used to describe the performance of thermal controls where the "differential" can be set at the factory. This would be the maximum temperature variation between the actual open and actual close temperatures of a thermal control.
>
> **Minimum Differential:** This term is used to describe the performance of thermal controls where the "differential" can be set at the factory. This would be the minimum temperature variation between the actual open and actual close temperatures of a thermal control.

Disc Type Control: Disc-type bimetallic devices get their name from the shape of the bimetallic element that is utilized in these devices. The bimetallic element is generally round in shape and is then specially formed to give it a "disc" like shape. In Disc Type Controls, the bimetallic disc is usually electrically isolated from the electrical circuit of the application.

FLA (Full Load Amperage): A term used to measure the amount of current an electrical motor draws during normal operation.

Gauge: A term used to describe the diameter of wire which is used to connect our thermal controls to your application.

Harness Assembly: A term used for when a single thermal control device is supplied with multiple lead connections or when multiple thermal controls are connected together to perform multiple functions in the end customer application.

High Limit Control: See Over Temperature Protector

Inductive Load: A term used of an electrical load associated with an inductor coil. When current passes through the coil, an electrical field is generated. The field has been "induced." The larger the coil or the greater the number of turns, the greater the induced field.

Insulating Sleeve: A term used to describe any type of material which is used to electrically isolate the body of a thermal control in the end application. Typically, the insulation material is in the form of a cylindrical "sleeve" which completely surrounds the body of the thermal control.

LRA (Locked Rotor Amperage): A term used to measure the amount of current an electrical motor draws under a fault or "locked" condition.

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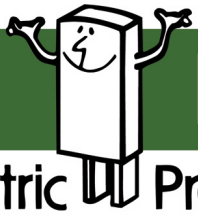

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Lead(s) or Lead Wire(s): A term used for any type of wire or connection that is crimped or welded to a thermal control and is used to make an electrical connection in the end application.

Manual Reset: A manual reset device functions by interrupting the electrical load of an application based on increases in temperature. These devices act in a similar manner to a circuit breaker in that once they are activated; they must be manually reset for the application to function again.

Motor Protector: A term used to describe a bimetal thermal control used to protect an electric motor from over heating. In general a motor protective device operates to both increases in temperature and increases in current.

Normally Closed: A term used for thermal controls where the electrical contacts open upon temperature rise.

Normally Open: A term used for thermal controls where the electrical contacts close on temperature rise.

Opposite End Termination: See Axial Termination

Over Current Control: A term used for thermal control devices which function primarily upon increases in current in an end application.

Over Temperature Protector (OTP): Over Temperature Protector type controls function like their name implies. The primary function of these devices is to provide high limit temperature protection in applications where the normal operating temperatures have increased due to over work or another type of fault condition.

Radial Termination: This term is used to describe the actual configuration where the terminals of connecting lead wires are attached to a thermal control device. Radial termination has leads that are connected to the device from a common end (same end termination).

Rated Current: A term used to describe the maximum allowable current that a thermal control can carry (pass through the device).

Rated Voltage: A term used to describe the maximum voltage that should be applied to a thermal control.

Resistive Load: A term used for electrical loads where the current is determined by the amount of resistance and the current in a given circuit such as a electrical heater.

Reverse Action: See Normally Open

Same End Termination: See Radial Termination

Self-Hold Thermal Control: Self-Hold devices are an innovative new type of thermal controls which again are generally used as an over temperature protector in applications. These devices

offer functionality similar to manual reset and non-reset types in that they offer an extra degree of safety in many different consumer applications but will automatically reset once the consumer disconnects the power source to the application.

Short Time Trip: A term used to describe the approximate reaction time of a bimetal thermal control in an electric motor in a "fault" condition. This measurement is expressed as a "length of time" at a given electrical load.

Single Pole - Single Throw (SPST): A term used to describe an electrical switch constructed with a single set of terminals and a single set of contacts.

Snap Action Thermal Control: Snap action devices are similar in function to creep action devices in that snap action devices will open and close an electrical circuit based on increases in either temperature and or current. The real difference is that they are produced with specially formed bimetallic elements which produce a wider temperature variation between the point where the thermal control opens and the point at which the device will close. The devices get their name from the "snapping" sound that the bimetallic element makes when it reacts to changes in temperature.

Temperature Control: Temperature Control functionality is when a thermal control is utilized in an application to control or regulate the temperature of a "heated" application. The primary function of the thermal control is to maintain a defined operating temperature which a design engineer has determined to provide for optimum performance of the end application.

Thermal Control: A generic term which is used to describe a bimetal type control which functions in an application through it sensing changes in temperature and or current.

Thermal Fuse (One Shots): A type of thermal control device which utilizes an internal "fusible link" which melts at a specified temperature. These devices are strictly used as a high temperature limit device as they are a one time use type control.

Thermal Protector: A Thermal Protector is a device which provides over-current or over-temperature protection in an application. This term is generally associated with terminology used by safety approvals agencies such as Underwriters Laboratories.

Thermostat: A Thermostat is a device which is usually associated with temperature control in an application. The basic mechanical difference between thermostats and thermal protectors is found in the internal spacings of the devices. A thermostat requires additional spacing requirements so that there is more "through air" spacing to serve as additional electrical isolation. In most cases a Thermostat will be slightly larger than a Thermal Protector due to the greater internal spacings required to obtain safety agency approvals.

Tolerance: See Calibration Tolerance