Thermal fuses

Order code	Manufacturer code	Description
26-0850	G4A01072C	72 DEG.C AXIAL THERMAL FUSE
26-0855	G4A01084C	84 DEG.C AXIAL THERMAL FUSE
26-0860	G4A01098C	98 DEG.C AXIAL THERMAL FUSE
26-0865	GA401121C	121 DEG.C AXIAL THERMAL FUSE
26-0870	G4A01167C	167 DEG.C AXIAL THERMAL FUSE
26-0875	G4A01184C	184 DEG.C AXIAL THERMAL FUSE
26-0880	G4A01128C	228 DEG.C AXIAL THERMAL FUSE

Thermal Fuses

FEATURES

- Temperature stable
- High temperature sensitivity
- Wide temperature range
- Small size
- Simple installation

DESCRIPTION

Thermal fuses are components which will automatically open a circuit and switch off an appliance, if the permissible operating temperature of the appliance is exceeded.

The response temperature can only be set by the manufacturer. In order to repair the circuit, the complete thermal fuse must be replaced.

Thermal fuses have a solid, dust and dirt-tight housing. They react to ambient temperature and are generally insensitive to current at rated levels.

APPLICATIONS

Appliances and equipment, electrical and machinery.

Examples

Cookers	Hot water appliances	Information technology
Stoves	Hair appliances	Computers
Grils	Hair driers	Laboratory equipment
Fryers	Hand driers	Cleaning appliances
Waffle irons	Extractor hoods	Motors
Coffee machines	Ventilators	Transformers
Gas heaters	Radio & TV's	Choker
Boilers	Recorders	Coils
	Office Machinery	Pumps
		Industrial plant

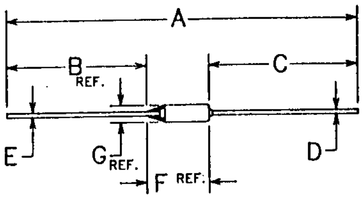
TEMPERATURE AND ELECTRICAL SPECIFICATIONS

PART NUMBER	MAX. OPEN TEMPERATURE (Tf°C)	HOLDING TEMPERATURE (TH/Tc°C)	MAX. OVERSHOOT TEMPERATURE
G4A01072C	72°C	57°C	100°C
G4A01084C	84°C	69°C	125°C
G4A01098C	94°C	83°C	140°C
G4A01121C	121°C	106°C	160°C
G4A01167C	169°C	154°C	210°C
G4A01184C	184°C	169°C	210°C
G4A01228C	228°C	200°C	240°C

ELECTRICAL RATINGS

VOLTAGE	250 VAC	120 VAC
RESISTIVE CURRENT	10.0A	15.0A
CURRENT	8.0A	14.0A

MICROTEMP® TCO Standard Dimensions



	Dimensions *inches (mm)*	G4A and G5A Series	G7F Series
Standard Leads (00)	A Overall Length ±.06 (±1.5) B Epoxy Lead Length (Reference) C Case Lead Length ± .12 (±3.0)	2.51 (63.8) 0.55 (14.0) 1.38 (34.9)	N/A N/A N/A
Long Lead (01)	A Overall Length ±0.6 (±1.5) B Epoxy Lead Length (Reference) C Case Lead Length ±.12 (±3.0)	3.26 (82.8) 1.30 (33.0) 1.38 (34.9)	3.26 (82.8) 1.50 (38.1) 1.38 (34.9)
Lead Material and Diameter	D Case Lead Diameter D Case Lead Material E Epoxy Lead Diameter E Epoxy Lead Material	.040 (1.0)* Tin Plated Copper** .040 (1.0) Silver Plated Copper	.023 (.57) Tin Plated Copper .023 (.57) Silver Plated Copper
Case Dimensions	F Case Length (Reference) G Case Diameter (Reference)	.58 (14.7) .158 (4.0)	.38 (9.6) .118 (3.0)

Figure 3
Solder

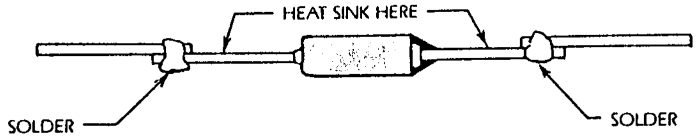


Figure 4
Internal Components of the Thermal Cutoff

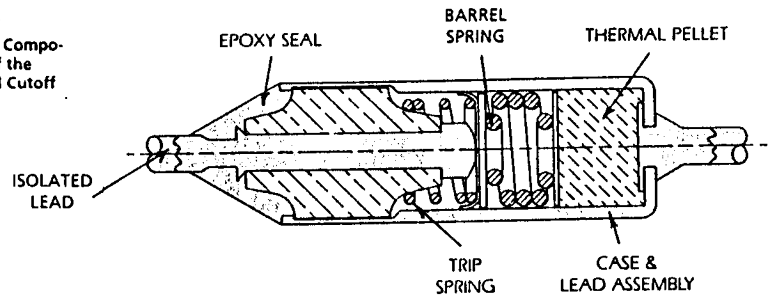


Figure 5
Weld Points

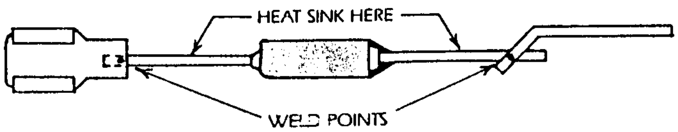


Figure 6
Splices and Termination

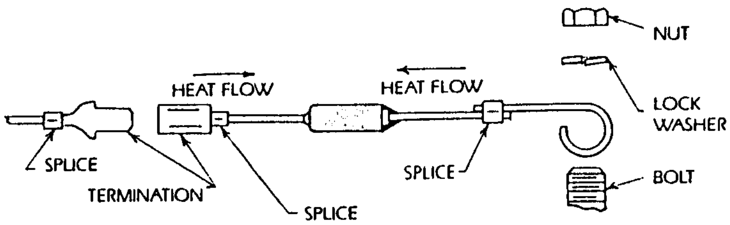
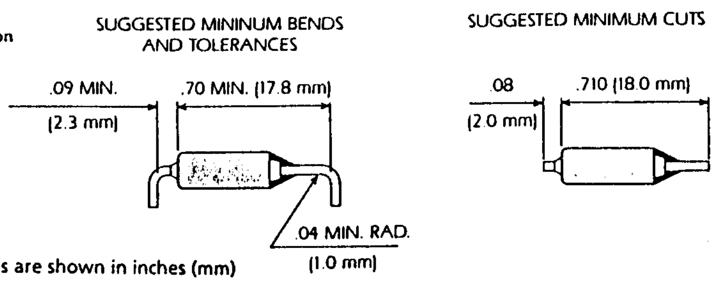


Figure 7
Configuration Constraints



Dimensions are shown in inches (mm)

Installation of Thermal Cutoffs

The performance of a MICROTEMP® thermal cutoff can be affected by installation methods such as soldering, welding, splicing, lead bending, insulation, clamping, and mounting. Certain precautions should be taken during installation to ensure that the MICROTEMP® thermal cutoff is not damaged, which may cause it to not operate in its intended manner. Likewise, care should be taken during installation to ensure that the TCO in every unit experiences the expected temperature range environment previously determined during the calibration temperature selection. The following guidelines should be used to minimize undesirable conditions that can result from improper installation practices.

Soldering Leads

Thermal cutoff leads should be heat sinked during the soldering operation. (See figure 3.) If excessive heat is conducted by the leads into the thermal cutoff, it can shorten the life of the TCO. In addition, excessive lead temperatures can damage the epoxy and possibly result in the TCO failing to open. More heat sinking is necessary for thermal cutoffs with low temperature ratings.

Test samples should be x-rayed before and after the soldering operation. The size of the chemical pellet should be measured with an optical comparator or a toolmaker's microscope to verify that no shrinkage has occurred during the soldering operation. The epoxy seal should retain its size and shape and not discolor. (See figure 4.) If the chemical pellet or the epoxy have changed size as a result of the soldering operation, more heat sinking is required.

Welding Leads

The thermal cutoff leads may also need to be heat sinked during a welding operation. (See figure 5.) The same precautions and tests described in the soldering section should be followed for welded leads as well.

To avoid damaging or welding internal parts, care should be taken that none of the welding current is conducted through the TCO. A welding current of hundreds of ampéres can weld the internal parts together, resulting in the TCO failing to open.

TCO leads must be supported during the weld operation to prevent breaking the thermal cutoff epoxy seal.

Splices & Terminals

Insecure splices and terminations may produce high resistance junctions which can cause selfheating (I^2R) as power is dissipated across these junctions during product operation.

Heat from these hot spots can flow down the thermal cutoff leads and increase the temperature of the thermal cutoff. (See figure 6.) Nuisance openings of the thermal cutoffs or epoxy burn can occur as a result of the heat generated by high resistance junctions. The splice or termination junction may initially measure low resistance, but can change to a much higher resistance after several temperature cycles. It is generally better to splice MICROTEMP® thermal cutoff leads to stranded lead wires rather than solid wires as the stranded wire may be crimped tighter and maintain better electrical contact during temperature cycling.

The temperature capabilities of the splice and/or termination should be considered. For example, solder back-up should be considered for splices or terminations used at temperatures exceeding 150°C.

Bending Leads

When configuring the leads, special care must be exercised in supporting the lead near the body of the thermal cutoff so that the epoxy will not be cracked or broken. At least 1/8" should be maintained between the epoxy seal and any lead bends. (See figure 7.)

Thermal Gradients

In certain applications, the TCO may be mounted in a position where heat is conducted to the body of the thermal cutoff through one of the leads resulting in thermal gradients across the TCO. To minimize thermal gradients and the temperature increase of the thermal cutoff body from this heat flow, attach the isolated lead (epoxy end) rather than the case lead to the heat source. Over time, the thermal cutoff life can be reduced by these thermal gradients if the isolated lead is at consistently lower temperature than the case lead. Long-term testing is recommended in determining whether these conditions exist in the application.

Ideal TCO placement subjects the entire TCO, case, leads, epoxy seal and internal parts to a uniform temperature environment. Care should be exercised in the placement of the TCO to minimize thermal gradients across the TCO.

Temperature Limits

Thermal cutoffs of any temperature rating should not be subjected to continuous normal temperatures in excess of 200°C. Higher continuous temperatures will weaken and ultimately break down the epoxy seal. Underwriters Laboratories' recognition of this product line limits its continuous use to a maximum of 200°C. Additionally, overshoot temperatures after the opening of the thermal cutoff should be minimized to avoid dielectric breakdown and reconduction of the thermal cutoff.

Caution . . . The thermal cutoff may fail to open the electrical circuit under certain conditions. Distortion of the case, breaking or cracking the seal, exposing the epoxy seal to cleaning solvents, compression of the leads and current surges which exceed the operating specifications of the thermal cutoff may cause the thermal cutoff not to open. In addition, pellet shrinkage due to thermal aging under some circumstances may also result in failure to open. Finally, a very low rate of temperature rise may produce conditions which may also result in failure to open. Care must be taken to avoid any mishandling or misapplication of the thermal cutoff.

Caution . . . Although TCOs are highly reliable devices, a TCO may fail to open in operation for one or more of the reasons set forth above. These conditions must be taken into account by the product design engineer in determining the level of reliability needed for the application. If failure of the TCO to open could result in personal injury or property damage, the product design engineer may want to consider using one or more redundant TCOs of different ratings to achieve the desired level of reliability. A number of consumer product design engineers have incorporated redundant TCOs of different ratings in their designs for this reason.

Agency Recognition

MICROTEMP® thermal cutoffs are recognized by the following major agencies:

UL	BEAB	MITI
CSA	VDE	

Agency ratings should be used only as a guideline. Independent testing of the finished product is necessary to determine that the thermal cutoff will operate as intended in the application. For further information or assistance, please call one of our Sales Engineers at (419) 525-8500.

Important Notice

The user must determine the suitability of the thermal cutoff for the application and assumes all risk and liability associated therewith.

The MICROTEMP® Thermal Cutoff Series

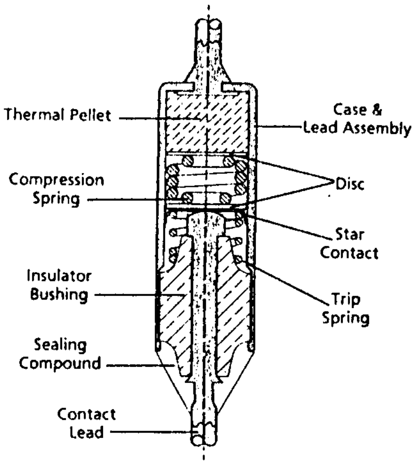
MICROTEMP® thermal cutoffs are available in a range of temperatures and electrical ratings to meet your application requirements (See figure 7). There are four primary types of thermal cutoffs available including three global agency rated series plus a high precision series with special quality certification. Standard dimensions of each TCO series are shown in figure 3 below.

G4 Series - Rated for continuous operating currents up to 10 amps @ 250 VAC (15 amps @ 120 VAC), the G4 Series MICROTEMP® TCO is the industry standard for over temperature protection. The G4 Series is applied to millions of appliances and personal care products each year providing reliable back-up protection for temperature controlling thermostats. In the event of the thermostat end of life condition, the MICROTEMP® TCO protects against potentially hazardous over-heating by interrupting the electrical current in the product. Many other products such as office machines, furnaces and portable heaters utilize the G4 Series MICROTEMP® TCO as a thermal safeguard.

Operating Principle of the MICROTEMP® TCO

The active trigger mechanism of the thermal cutoff is an exclusively formulated, electrically nonconductive pellet. Under normal operating temperatures, the solid pellet holds spring loaded contacts closed. (See figure 1)

G4 SERIES MICROTEMP® TCO
CLOSED CIRCUIT

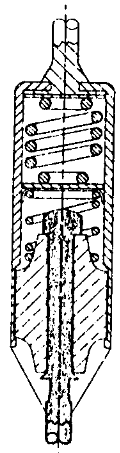


Grey area shows current path

Figure 1

When a predetermined temperature is reached, the pellet melts, allowing the barrel spring to relax. The trip spring then slides the contact away from the lead and the circuit is opened. (See figure 2)

G4 SERIES MICROTEMP® TCO
OPEN CIRCUIT



Grey area shows opened or broken current path

Figure 2

Once a MICROTEMP® thermal cutoff opens a circuit, the circuit will remain open until the TCO is replaced. This replacement procedure must include correction of the fault condition before the product is operated again.

Temperature Limits of the MICROTEMP® TCO

The temperatures experienced during normal operation, including expected temperature overshoots, will determine the life expectancy of the TCO. Nuisance trips can result if the thermal cutoff rating is too close to the temperatures experienced during normal operation. Continuous temperatures above 200°C will cause the sealing compound to weaken and ultimately fail. In addition, as shown each thermal cutoff calibration has a maximum temperature overshoot rating (T_M). Overshoot temperatures above this rating may cause dielectric breakdown of the thermal cutoff and allow reconduction to occur.

INSTALLATION TIPS

To ensure loss-free heat transfer, installation or mounting should be directly onto the heat source. When soldering onto the electrical connections, care must be taken to provide appropriate heat-sinking (e. g. heat-conducting pliers). Where necessary, allow ease of access for retrofit.

Fuses are partly sealed against varnish etc. Connections can be customised – e. g. flexible leads, wire, push-on terminals or formed to specification on request.

Minimum rate of temperature change 0.1 K/min.