MICROTEMP® Thermal Cutoffs: INTRODUCTION

Upper Limit Temperature Protection

MICROTEMP® thermal cutoffs from Therm-O-Disc offer an accurate, reliable solution to the need for upper limit temperature protection. Known as a thermal fuse, thermal link, or TCO, the MICROTEMP® thermal cutoff provides protection against overheating by interrupting an electrical circuit when operating temperatures exceed the rated temperature of the cutoff.

MICROTEMP® Features:

- One-shot operation cuts off electrical power
- Current interrupt capacity up to 25 amps @ 250VAC
- Low resistance
- Compact size

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.

When a predetermined temperature is reached, the pellet melts, allowing the compression spring to relax. The trip spring then slides the contact away from the lead and the circuit is opened *(see figures 1 and 2)*.

After a MICROTEMP® thermal cutoff opens a circuit, the TCO needs to be replaced. This replacement procedure must include correction of the fault condition before the product is operated again.

MICROTEMP® G4, G6 & G7 Series TCO

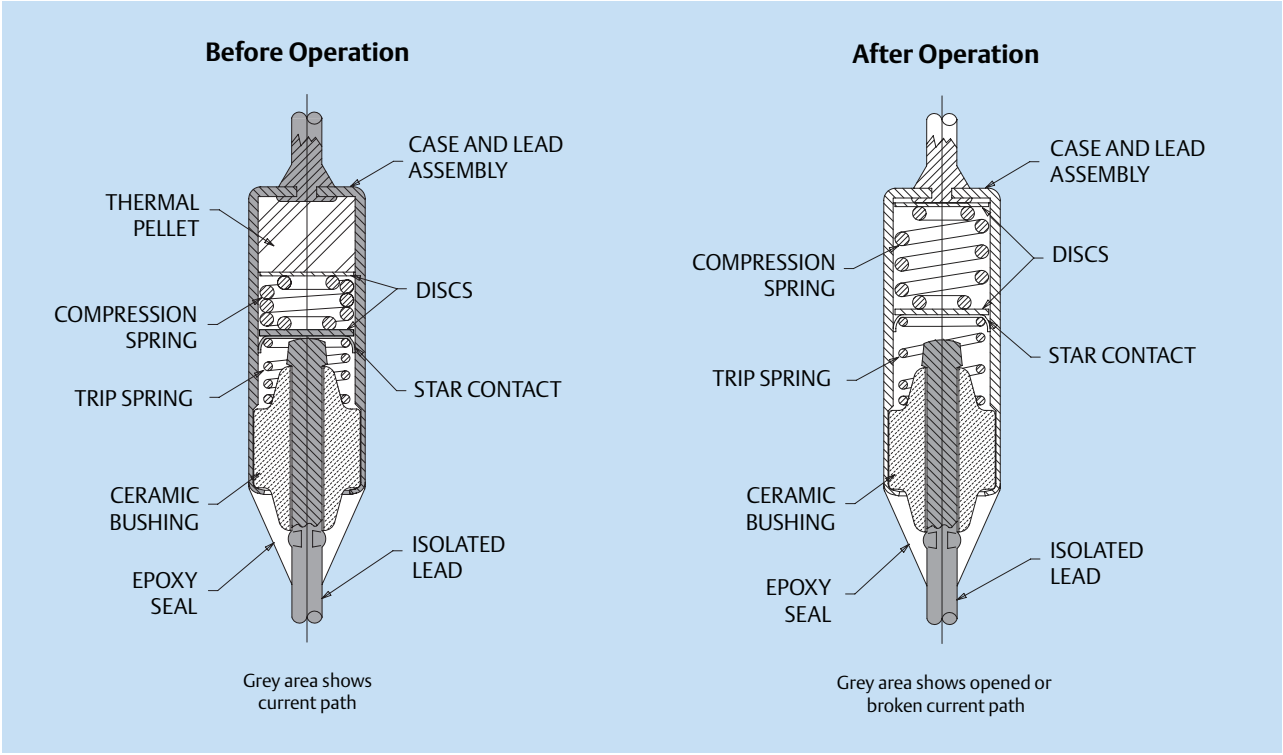


Figure 1

MICROTEMP® G5 & G8 Series TCO

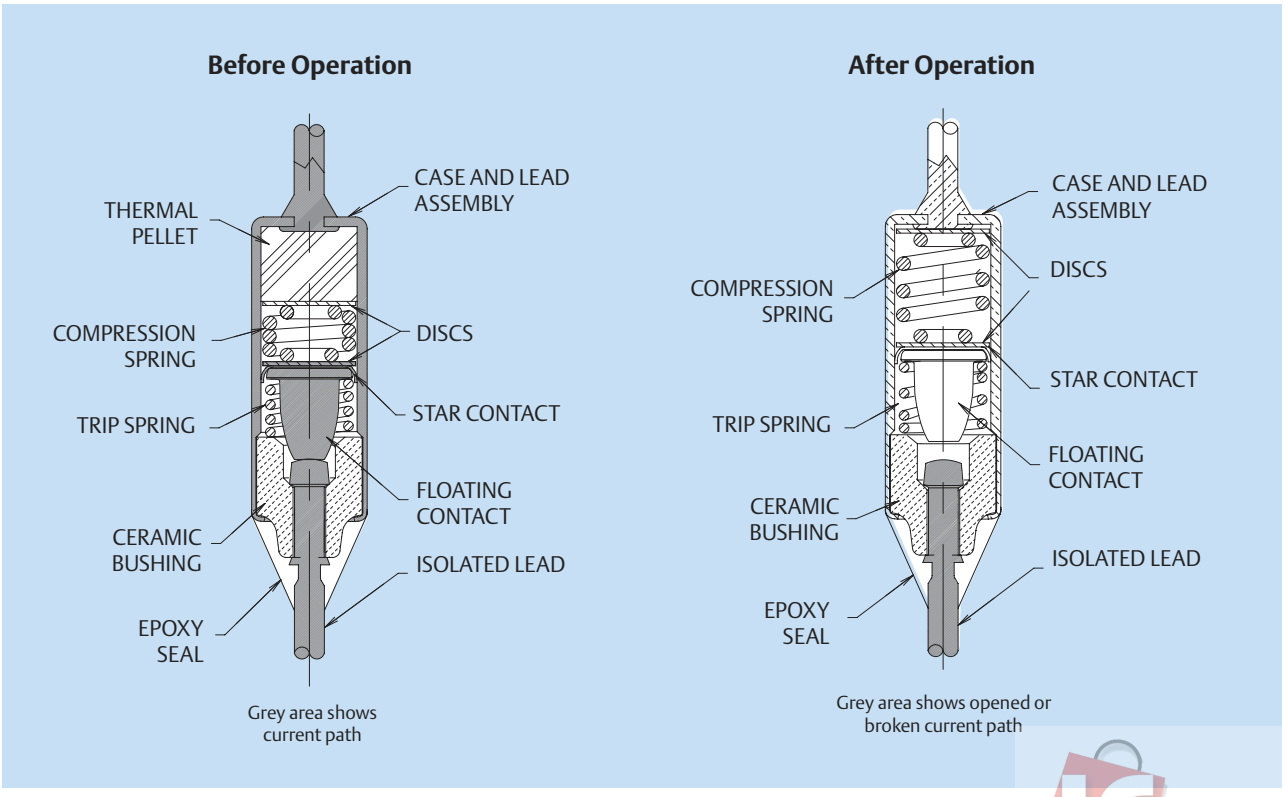


Figure 2

MICROTEMP® Thermal Cutoffs: TYPES & SPECIFICATIONS

MICROTEMP® thermal cutoffs are available in a range of temperatures and electrical ratings to meet application requirements *(see Microtemp® Operating Temperature Summary and Electrical Rating Summary on page 4)*. There are 5 primary types of thermal cutoffs available. Standard dimensions of each TCO series are shown on page 4.

G Series: This "Global" series or G designation represents the world standard in thermal cutoffs. MICROTEMP® TCOs were the first chemical-pellet spring-type TCO ever developed and continue to be the thermal cutoff of choice for over 35 years.

E Series: This new "Environmentally" friendly series holds Agency recognition equivalent to the G series and has been designed to comply with the Restriction of Hazardous Substances in Electrical and Electronic Equipment (ROHS) Directive (2002/95/EC). None of the substances specified in this Directive have been intentionally incorporated into the E-series products.

G4 Series

Rated for continuous operating currents up to 10 amps @ 250VAC (15 amps @ 120VAC, 5 amps @ 24VDC), 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 and other over-temperature conditions. The G4 series is also widely applied in office machines, portable heaters and industrial equipment as a thermal safeguard.

G5 Series

Designed for higher voltage and current applications than the G4, the G5 series MICROTEMP® TCO is rated for operating currents up to 20 amps @ 250VAC and 277 VAC (25 amps @ 120VAC). Similar in appearance to the G4 series, the G5 series has a different internal construction designed for interrupting higher currents and withstanding higher temperatures.

G6 Series

The G6 series MICROTEMP® TCO can be utilized in applications where a higher maximum-overshoot temperature rating is not required, yet it is rated for operating currents up to 16 amps @ 250VAC. It is the same physical size as the G4, G5 and G8 series TCOs.

G7 Series

The G7 series MICROTEMP® TCO is designed to satisfy applications requiring miniaturized components that do not need maximum current interrupt capability. The G7 is just 2/3 the size of the G4 and G5, and with a current interrupting capability of 5 amps @ 250VAC (5 amps @ 24VDC), it is capable of meeting the requirements of transformers, motors, battery packs and electronic circuit applications.

G8 Series

Designed for very high-current applications such as major appliances and high-wattage electric heat packages, the G8 series MICROTEMP® TCO is rated for operating currents up to 25 amps @ 250VAC (20 amps @ 277VAC). More economical than electromechanical bimetal-type one shot devices, it can be utilized in applications where its small size is an advantage in terms of mounting (it's the same physical size as the G4, G5 and G6 series TCOs) and thermal response.

MICROTEMP® TCO Operating Temperature Summary

Open Temp T_f °C	Holding Temperature °C		Maximum Overshoot Temperature °C						
	T_h °C G4, G5, G7 Series	T_h °C G6, G8 Series	T_m °C G4 Series	T_m °C G5 Series	T_m °C G6 Series	T_m °C G7 Series	T_m °C G8 Series	T_m °C R9 Series	T_m °C R7 Series
070	55	45	130	175	130	125	175	130	125
072	57	47	100	175	100	—	175	100	—
073	58	48	130	175	100	—	175	130	130
075	—	—	125	190	—	125	—	125	125
077	62	52	125	200	125	125	200	125	125
081	—	—	125	200	----	125	—	125	125
084	69	59	125	200	125	125	200	125	125
087	—	—	140	—	—	140	—	140	140
093	78	68	140	215	—	140	215	140	140
098	83	73	140	215	140	140	215	140	140
100	—	—	—	215	—	130	—	—	130
104	89	79	150	225	150	—	225	150	—
110	95	85	150	225	—	140	225	150	140
115	—	—	160	235	—	140	—	160	140
117	102	92	160	235	160	150	235	160	150
121	106	96	160	235	160	150	235	160	150
125	—	—	185	235	—	150	—	185	150
128	113	103	205	235	205	150	235	160	150
134	—	—	205	250	—	175	—	205	175
141	—	—	205	250	—	175	—	205	175
144	129	119	240	250	240	175	250	175	175
147	—	—	205	240	—	175	—	205	175
152	137	127	205	250	205	175	—	175	175
158	—	—	240	285	—	200	—	240	200
167	152	142	240	285	240	200	285	210	200
172	—	—	240	350	—	200	—	240	200
184	169	159	210	350	210	200	350	210	200
190	—	—	310	350	—	270	—	310	270
192	177	167	210	350	210	—	350	210	210
205	—	—	310	375	—	300	—	310	300
216	200	191	375	375	—	—	—	375	—
229	200	200	375	375	375	—	375	375	—
240	200	200	450	375	450	—	375	375	—

T_m – Maximum overshoot temperature: temperature up to which TCO will not change status

T_f – Functioning open temperature tolerance: +0, -5°C

T_h – Maximum temperature of the MICROTEMP® TCO measured at the case end of the thermal cutoff at which the thermal cutoff can be maintained for a period for 168 hours without opening.
NOTE: it is advised that TCOs are not exposed to continuous operating temperatures in excess of T_f -25°C.

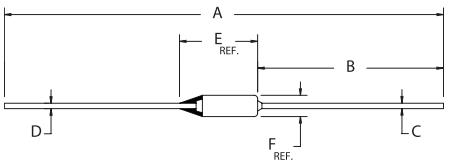
C.T.I. – Comparative tracking index (all primary thermal cutoffs): 250VAC

NOTE: G4, G5, G6 ,G7 and G8 series TCOs with $T_F \geq 175$°C comply with UL conductive heat aging (CHAT) requirements.

Electrical Rating Summary

Agency	Electrical Current & Voltage Rating								
	G4 Series		G5 Series	G6 Series	G7 Series		G8 Series	R9 Series	R7 Series
	Resistive	Inductive	Resistive	Resistive	Resistive	Inductive	Resistive	Resistive	Resistive
UL/CSA	10A/250VAC 15A/120VAC 5A/24VDC	8A/250VAC 14A/120VAC	20A/250VAC 25A/120VAC 21A/240VAC 20A/277VAC	16A/250VAC	5A/250VAC 5A/24VDC	4.5A/250VAC 4.5A/120VAC	25A/250VAC	—	—
VDE	10A/250VAC 15A/120VAC 5A/24VDC	8A/250VAC 14A/120VAC	20A/250VAC	16A/250VAC	5A/250VAC 5A/24VDC	4.5A/250VAC 4.5A/120VAC	25A/250VAC	—	—
METI	10A/250VAC	—	15A/250VAC	15A/250VAC	5A/250VAC 5A/24VDC	—	—	15A/250VAC	7A/250VAC 7A/24VDC
CCC	10A/250VAC	—	16A/250VAC	—	5A/250VAC	—	—	—	—

MICROTEMP® TCO Standard Dimensions



	Dimensions – Inches (millimeters)	G4, G5, G6 & G8 Series	G7 Series
Standard Leads	A Overall Length ± .12 (±3.0) B Case Lead Length ± .06 (± 1.5)	2.51 (63.8) 1.38 (34.9)	N/A N/A
Long Leads	A Overall Length ± .12 (±3.0) B Case Lead Length ± .06 (± 1.5)	3.26 (82.9) 1.38 (34.9)	3.26 (82.9) 1.38 (34.9)
Lead Material and Diameter	C Case Lead Diameter C Case Lead Material D Epoxy Lead Diameter D Epoxy Lead Material	0.040 (1.0) Tin-Plated Copper 0.040 (1.0) Silver-Plated Copper	0.023 (.57) Tin-Plated Copper 0.023 (.57) Silver-Plated Copper
Case Dimensions	E Case Length (Reference) F Case Diameter (Reference)	0.58 (14.7) 0.158 (4.0)	0.38 (9.6) 0.118 (3.0)

Agency Recognition

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

UL	BEAB	METI	CSA	CCC	VDE
Underwriters Laboratories Inc. (USA)	*British Electrotechnical Approvals Board*	*Ministry of Economy, Trade and Industry of Japan*	*Canadian Standards Association*	*China Cumpulsary Product Certification*	*Varband Deutscher Electrotechniker e.V. (F. R. G.)*

MICROTEMP® thermal cutoffs are recognized by the major approval agencies throughout the world for AC circuit applications. These agency electrical ratings can be used as a guideline when evaluating specific thermal cutoff applications. However, the electrical and thermal conditions to which the thermal cutoff may be exposed in an application may differ significantly from agency test conditions. Accordingly, customers should not rely solely on agency ratings but rather must perform adequate testing on the particular application to confirm that the TCO selected is appropriate for that application and will operate as intended.

Important Notice

Users must determine the suitability of the control for their application, including the level of reliability required, and are solely responsible for the function of the end-use product.

These controls contain exposed electrical components and are not intended to withstand exposure to water or other environmental contaminants which can compromise insulating components. Such exposure may result in insulation breakdown and accompanying localized electrical heating.

A control may remain permanently closed or open as a result of exposure to excessive mechanical, electrical, thermal or environmental conditions or at normal end-of-life. If failure of the control to operate could result in personal injury or property damage, the user should incorporate supplemental system control features to achieve the desired level of reliability and safety. For example, backup controls have been incorporated in a number of applications for this reason.