

# Product Information



# D SERIES THERMAL CUT-OFFS

# What is... the Thermal Cut-Off?

## DESCRIPTION

The 3M Thermal Cut-Off is a miniature, one-shot, temperature-sensitive fuse which prevents appliances, electrical and electronic equipment from generating unsafe temperatures.

## AVAILABILITY

More than twenty specific Cut-Off points are available, ranging from 63°C (136°F) to 242°C (468°F). Accuracy of standard production units is plus or minus 1.7°C ( $\pm 3.0^\circ\text{F}$ ).

## OPERATION

The Thermal Cut-Off contains a solid, heat-sensitive chemical pellet which is formulated to melt and flow at a closely controlled and predictable temperature. Under normal ambient temperature conditions, the solid pellet and the compression spring hold the contacts together, forming a closed circuit from lead to lead. Should the product or component malfunction, the pellet will melt and the trip spring will force the star contact and compression spring into the molten pellet and away from the wire contact. Current flow is halted with a positive and permanent action.

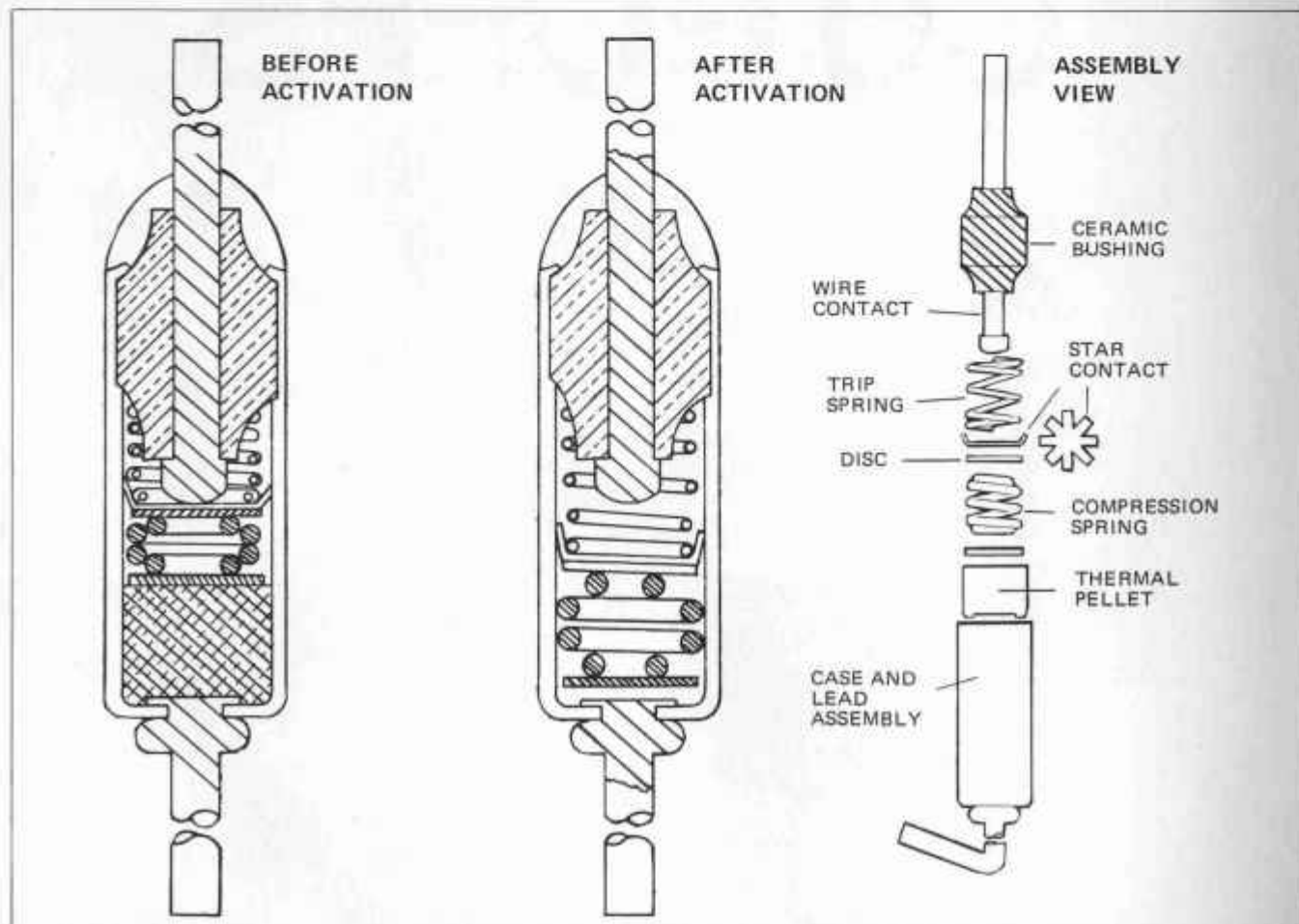
## WHY ADD THERMAL PROTECTION?

Thermal protection of electrical equipment is important both for safety and for the protection of the malfunctioning device. A Thermal Cut-Off can prevent catastrophic appliance failure upon malfunction of a control thermostat; or, used alone in a component, the Thermal Cut-Off can prevent a fire hazard.

## SPECIAL BENEFITS

The 3M Thermal Cut-Off is available in a variety of mounting configurations.

- \* Low Cost
- \* Miniature Size
- \* Ease of Installation
- \* B.S.I. approved, VDE approved, UL recognised, CSA certified.
- \* Sealed Packaging, operable in dry and most wet conditions.
- \* Stable Temperature Characteristics
- \* Rapid Positive Action
- \* Broad Voltage and Current Range, AC or DC
- \* Corrosion Protection
- \* Thermal Shock and Vibration Resistant





### CURRENT DERATING

Temperature ratings of 3M Thermal Cut-Offs are determined in a warm circulating oil bath where the temperature is programmed to increase at a rate of 0.5°C/min. Downgrading of the component rating may be necessary with current flow over 6 Amperes where air flow over the Cut-Off is restricted. Thermal downgrading may also be necessary above 15 Amperes in an air environment.

### RESPONSE TIME

Test have been conducted by 3M laboratories to determine the time lapse between Thermal Cut-Off exposure to activation temperature and the break in

electrical continuity. For these tests, the Cut-Offs are submerged in a constant temperature oil bath. As the Thermal pellet is activated, an event recorder notes the elapsed time for a 12 VAC to 0 VAC drop. The Cut-Off responds as follows (times are average).

Oil Bath Temperature	Time of Failure
151°C	26 Seconds
154°C	15.6 Seconds
159°C	12.8 Seconds

The type of insulation sleeving, amount of air flow, proximity to heat source and other variables affect response time.

# Specification

The electrical resistance of the 3M D Series Thermal Cut-Off is of the same order of magnitude as that found in an equal length of 19 s.w.g. solid copper wire. With proper air flow, heat generation below 15 Amperes is minimal. Above 15 Amperes, the D Series may open at a slightly lower temperature than the rated value making adequate air flow essential. The upper limit on current capacity will depend on the environment for each specific application. Large volumes of cooling air are required for this type of operation, in order to dissipate the effect of  $I^2R$  heating. Controlled series resistance measurements are made across a total lead span of 1.0-inch on all production units. The average resistance value is approximately 0.8 milliohms, with a quality control limit of 1.1 milliohms.

### Opening Temperatures Available

°C	°F
63	146
70	158
76	168
81	178
85	185
90	194
96	204
98	208
103	218
108	227
115	239
118	244
125	257
139	283
149	300
167	333
181	358
192	377
213	415
226	438
242	468

### Mechanical Dimensions

DXXX-001	DXXX-002
A. Silver-plated brass	A. Silver-plated brass
B. 0.457"	B. 0.457"
C. 0.158" diameter	C. 0.158" diameter
D. 0.69" (epoxy end)	D. 1.38" (epoxy end)
E. 1.38" (case end)	E. 1.38" (case end)
F. 2.53" ± 0.12"	F. 3.22" ± 0.12"

### Thermal Parameters

Minimum	63°C
Maximum	242°C
Standard Tolerance	±1.7°C

### Identification

3M Thermal Cut-Off	DXXX-000
	GYYY-ZZZ

- D - Series
- XXX - Opening temperature, degrees Centigrade
- 000 - Lead configuration or termination
- GYYY - Internal identification
- ZZZ - Opening temperature, degrees Fahrenheit

