

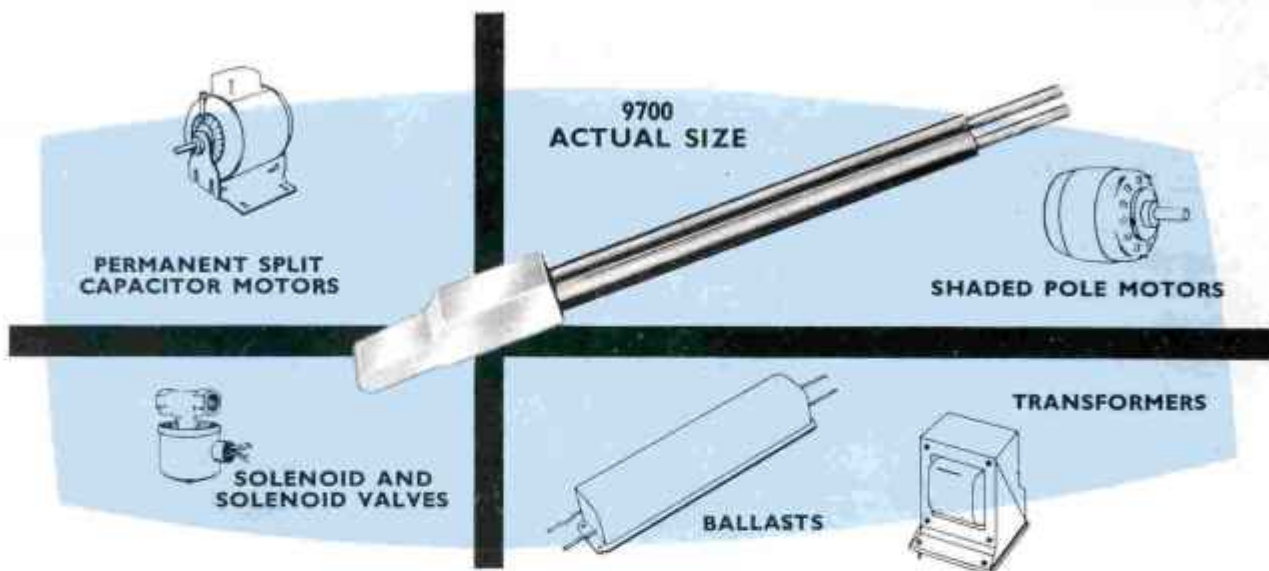
KLIXON

INHERENT OVERHEAT PROTECTORS

MINIATURE SNAP-ACTING PROTECTOR 9700 SERIES



MOPR-10



FEATURES

- **Snap-action** — positive make and break assured with proven Spencer strip disc.
- **Precision calibration** — temperature calibrated and inspected in controlled ambients for dependable, consistent performance.
- **Sealed steel case** — withstands impregnation and baking . . . may be varnish dipped.
- **Miniature size** — compactly designed for ease of installation.
- **Long life** — fine silver contacts, terminals, specially selected components . . . sealed for trouble free operation.
- **Maximum safe output** — shuts down unit when maximum allowable temperature is reached.

DESCRIPTION

The KLIXON 9700 Protector is a newly designed, miniature protector developed specially to protect shaded pole and permanent split capacitor motors, fluorescent ballasts, solenoids and transformers against overheating.

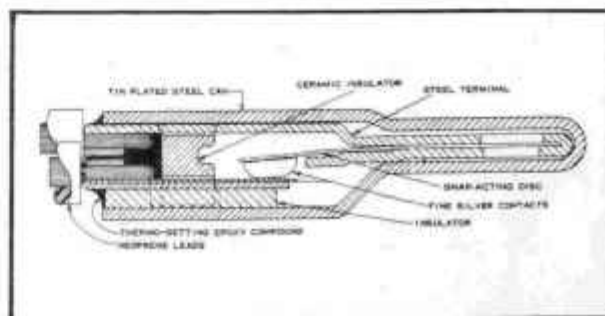
The unit is extremely small in size and light in weight, and is both temperature and current sensitive. Because the 9700 is sealed to withstand impregnation and baking, the unit can be mounted directly in the motor windings where it can best sense the true temperature of the electrical equipment. Complete overtemperature protection is thus achieved.

Since the case is not electrically insulated, the protector is furnished with a standard Mylar sleeve.

OPERATION

The 9700 Miniature Snap-acting Protector uses the same principle of action as the millions of KLIXON Inherent Motor Protectors now in use. Fine silver contacts are used and the circuit is normally closed. The disc is operated by the current passing through it and heat received from the motor windings. When the temperature of the disc reaches a predetermined calibration point corresponding to the maximum safe limit of the winding, the disc snaps open, thereby interrupting the circuit. This permits maximum output while limiting the windings to a safe operating temperature. When the winding temperature has returned to a normal safe limit, the protector will automatically reset.

The 9700 has a fixed differential. This results in a **much lower average** winding temperature than the opening temperature of the protector should a heavy overload cause prolonged cycling of the protector.



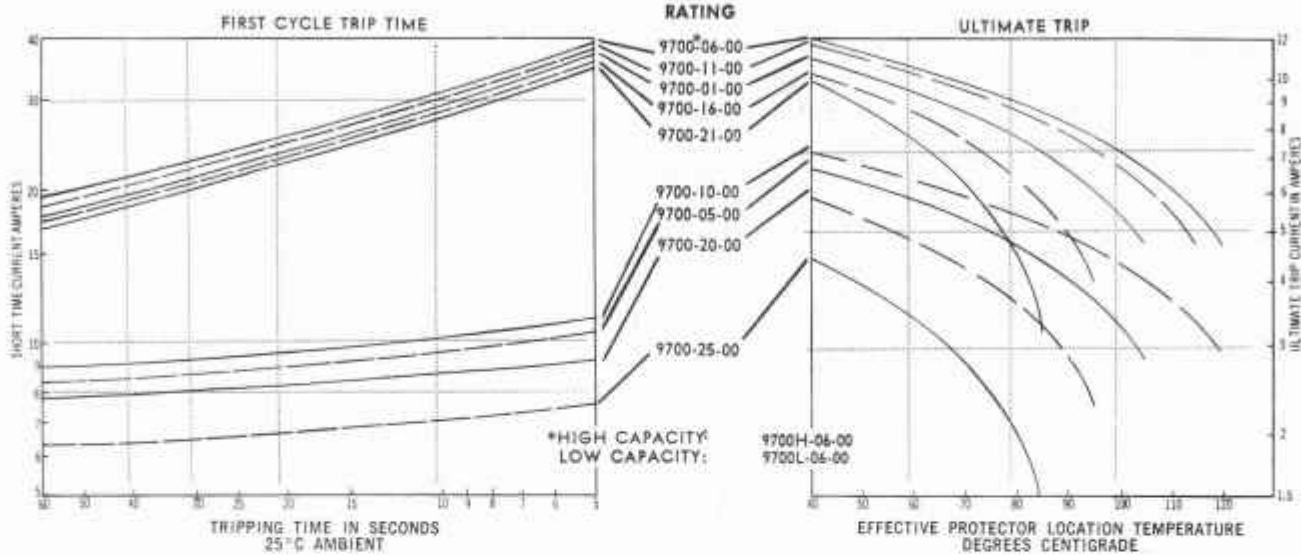
SEI

SALFORD ELECTRICAL INSTRUMENTS LIMITED
PEEL WORKS BARTON LANE ECCLES MANCHESTER TELEPHONE: ECCLES 5081 TELEX: 66711
A SUBSIDIARY OF THE GENERAL ELECTRIC COMPANY LIMITED OF ENGLAND

S.E.C.



APPROXIMATE OPERATING CHARACTERISTICS CURVES



MAXIMUM CURRENT RATING

TYPE	AMPERES		
	24 VDC	115 VAC	230 VAC
9700L	12	12	9
9700H	18	18	13

U/L LISTING

The 9700L has passed the limited short circuit tests with 1000 amps., 240 volts and a 30 amp. fuse. (U/L report File #E15962, dated 31/12/59.)

STANDARD OPERATING TEMPERATURES

Standard operating temperatures are 75°C, 90°C, 95°C, 100°C, 105°C, 110°C, 115°C, 120°C, 130°C, 135°C.

DIFFERENTIAL

Ranges from 20°C in the lower opening temperature ratings to 50°C in the higher opening temperature ratings.

ENGINEERING TEST SAMPLES

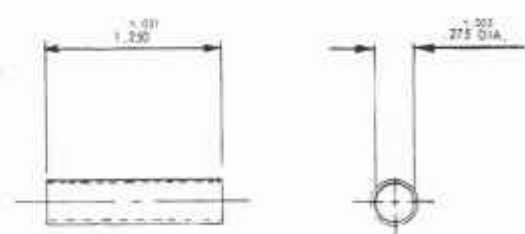
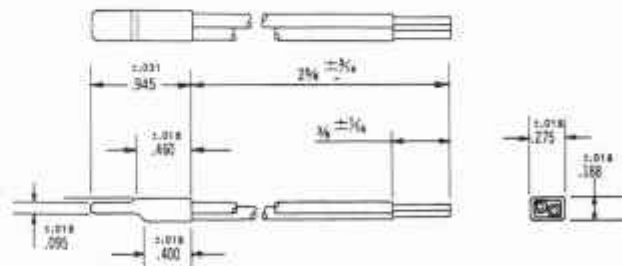
Engineering test samples are available for your particular application. The information requested below will permit selection of sample ratings.

1. Name plate data.
2. Maximum permissible winding temperature.
3. Minimum continuous current to produce this temperature.
4. Stalled rotor (or equivalent) current.
5. Protector location temperature.

6. Length of time required to heat the winding to maximum permissible temperature under stalled rotor (or equivalent) condition.

DIMENSIONS IN INCHES

Lead dimensions as shown are standard and should be used wherever possible.



MATERIAL: TWO LAYERS OF MYLAR WOUND INTO SPIRAL TUBE, WITH EACH LAYER OVERLAPPING ON ITSELF TO A MIN. OF .063 & TOTAL MIN. CONTINUOUS THICKNESS .004".

LIST No. K. 9700/6008

SEI

overheat protectors

miniature snap-acting protector
9700 series



Features

- **Temperature settings** — ranging from + 75° C to + 150° C
- **Snap-action** — positive make and break assured with proven strip disc.
- **Precision calibration** — temperature calibrated and inspected in controlled ambients for dependable, consistent performance.
- **Sealed steel case** — withstands impregnation and baking . . . may be varnish dipped.
- **Miniature size** — compactly designed for ease of installation.
- **Long life** — fine silver contacts, terminals, specially selected components . . . sealed for trouble free operation.
- **Maximum safe output** — shuts down unit when maximum allowable temperature is reached.
- **Fine silver contacts.**

Description

The 9700 Protector is a miniature protector developed specially to protect shaded pole and permanent split capacitor motors, fluorescent ballasts, solenoids and transformers against overheating.

The unit is extremely small in size and light in weight, and is both temperature and current sensitive. The unit can be mounted directly in the motor windings where it can best sense the true temperature of the electrical equipment. Complete overtemperature protection is thus achieved.

The 9700 Protector is available with a high-resistance or low resistance bimetal disc.
High resistance — current-sensitive design.
Low resistance — less current-sensitive design.
The case is electrically insulated by a durable Mylar insulating sleeve. In view of the wide variety of possibilities, the winding protector can be perfectly adapted to the characteristic of any type of motor.

Application Examples

- Single-phase motors (in main circuit)
- Choke coils
- Solenoid valves
- Transformers
- Three-phase motors (in control circuit)
- DC-motors (in control circuit)

Insulation Mylar Sleeve (Polyester)

Minimum thickness 0.1 mm.

If required, shrinkable sleeves can be supplied.
Temperature class B

Leads

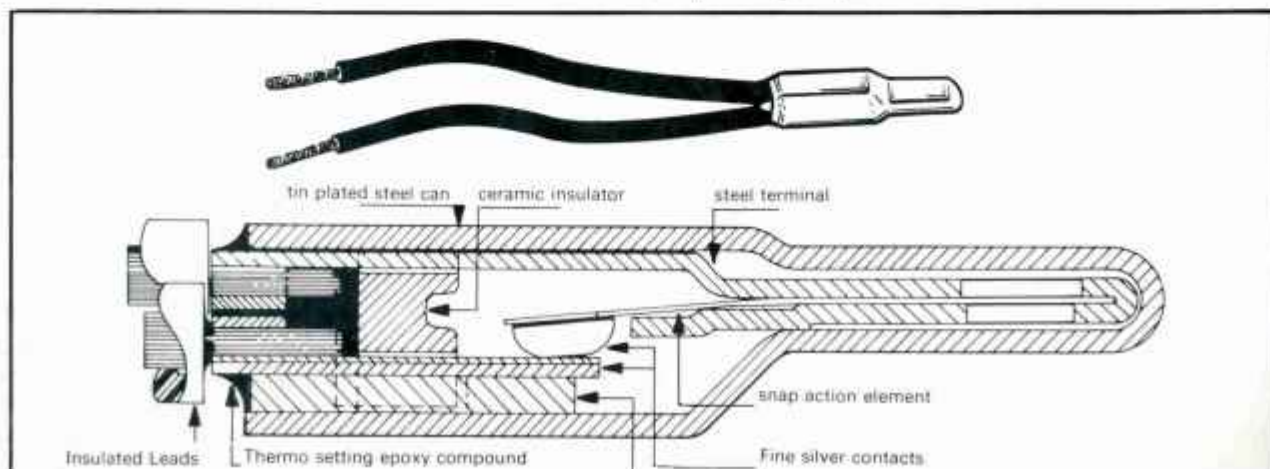
Standard Type (code 11) = Neoprene leads
67 mm long, 10 mm stripped. Special lead lengths or material available as specified.
Standard lead lengths are 110, 160 or 210 mm.
Temperature class A.

Maximum current rating

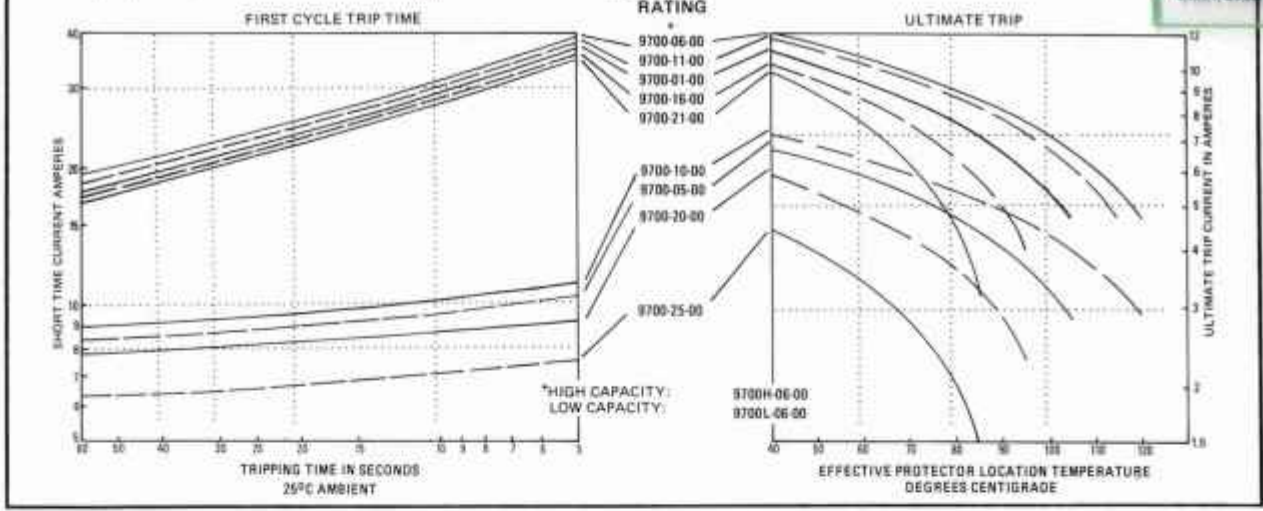
TYPE	AMPERES		
	24 VDC	115 VAC	230 VAC
9700L	12	12	9
9700H	18	18	13

Operation

The 9700 Miniature Snap-acting Protector uses the same principle of action as the millions of other Snap-action Inherent Motor Protectors now in use. Fine silver contacts are used and the circuit is normally closed. The disc is operated by the current passing through it and heat received from the motor windings. When the temperature of the disc reaches a predetermined calibration point corresponding to the maximum safe limit of the winding, the disc snaps open, thereby interrupting the circuit. This permits maximum output while limiting the windings to a safe operating temperature.



Approximate operating characteristics curves



When the winding temperature has returned to a normal safe limit, the protector will automatically reset. The 9700 has a fixed differential. This results in a much lower average winding temperature than the opening temperature of the protector should a heavy overload cause prolonged cycling of the protector.

U/L Listing

The 9700L has passed the limited short circuit tests with 1000 amps., 240 volts and a 30 amp. fuse. (U/L report File #E15962, dated 31/12/59).

Differential

Ranges from 20°C in the lower opening temperature ratings to 50°C in the higher opening temperature ratings.

Engineering test samples

Engineering test samples are available for your particular application. The information requested below will permit selection of sample ratings.

1. Name plate data.
2. Maximum permissible winding temperature.
3. Minimum continuous current to produce this temperature.
4. Stalled rotor (or equivalent) current.
5. Protector location temperature.
6. Length of time required to heat the winding to maximum permissible temperature under stalled rotor (or equivalent) condition.

Code

9700 L 05 11
 Type Contact rating Temperature Leads and terminals

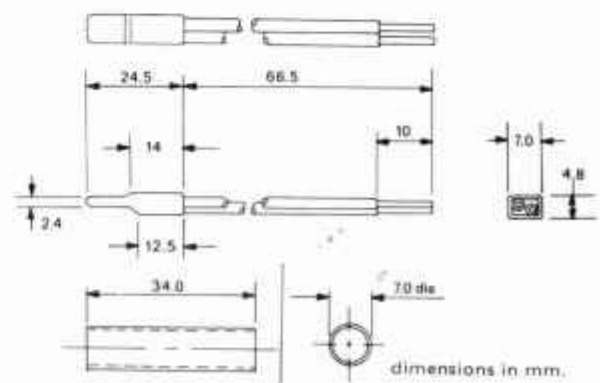
Operating temperatures

Opening temperature °C Tolerance: +5°C	Less current - sensitive types	Current - sensitive types
75*	9700L 51-11	9700L 55-11
90*	9700L 21-11	9700L 25-11
95	9700L 31-11	9700L 35-11
100	9700L 26-11	9700L 30-11
105*	9700L 16-11	9700L 20-11
110	9700L 36-11	9700L 40-11
115	9700L 41-11	9700L 45-11
120*	9700L 01-11	9700L 05-11
130	9700L 11-11	9700L 15-11
135*	9700L 06-11	9700L 10-11
140	9700L 66-11	9700L 70-11
145	9700L 76-11	9700L 80-11
150	9700L 46-11	9700L 50-11

* Limited quantities of these types are normally available from stock.

Dimensions

Lead dimensions as shown are standard and should be used wherever possible.



MATERIAL: TWO LAYERS OF MYLAR WOUND INTO SPIRAL TUBE, WITH EACH LAYER OVER LAPPING ON ITSELF TO A MIN. OF .063 & TOTAL MIN. CONTINUOUS THICKNESS .004"

SEI

precision thermostats



General

C4344 Thermostats are tiny, snap-acting disc type controls. Their small size makes them particularly suitable for application where space and weight accommodations are limited.

Description

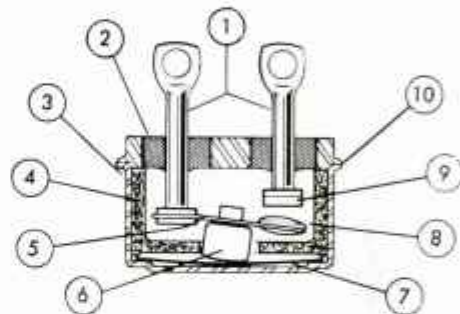
C4344 Thermostats are hermetically sealed by a unique welding process for use under all environmental conditions. The snap-acting disc is the actuating element. It is located at the bottom of the copper-nickel plated steel *cup for fast temperature sensing of any surface on which the thermostat is mounted, or of air or liquids to which the bottom of the thermostat is exposed. A movable contact arm, transfer pin, contacts, terminal posts, and insulator complete the internal base assembly.

A wide variety of terminals and mounting brackets can be supplied (see Pages 3 and 4). A silicone rubber overmould is available when a weatherproof unit is required to protect the terminals.

*The cup can be plated with cadmium or black chromate for added corrosion resistance and or non-reflective qualities at a slight additional charge.

Application examples

- Ground support equipment
- Electric and radar equipment
- Fuel pump motors
- Gyros
- Cabin air conditioning systems
- Accelerometers
- Aerial cameras
- Missile heating blankets
- Power tubes
- Bearings subject to overheat conditions



1. Terminal Posts
2. Compression Glass Seal
3. Cup
4. Insulator
5. Movable Contact Arm
6. Transfer Pin
7. Disc
8. Movable Contact
9. Stationary Contact
10. Hermetic Welded Seal



Special contacts

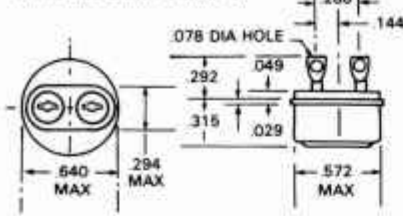
Gold plated contacts can be furnished for the electrical loads listed in the following table to assure reliable circuit making under low wattage conditions. *Gold plated contacts are not suitable for heavier loads.*

30 v-ac/dc	500ma and below
115 v-ac	200ma and below
230 v-ac	100ma and below

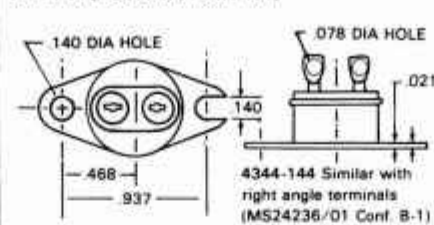
Contact ratings

30 v-ac/dc	125 v-ac	250 v-ac	Life Cycles
	Amperes		
5.0	2.0	1.0	100,000
5.5	3.0	1.5	50,000
6.0	4.0	2.0	25,000
6.5	5.0	2.5	10,000
7.0	6.0	3.0	5,000

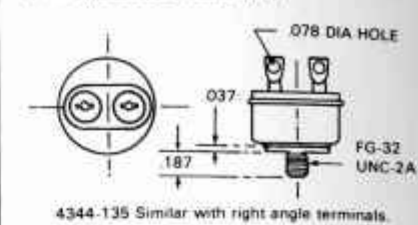
4344-7 (MS2423G/01 Conf. A)



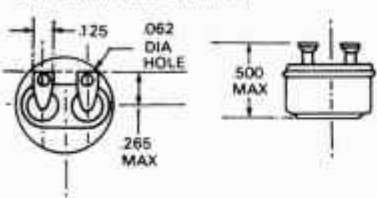
4344-184 (MS2423G 01 Conf. A-1)



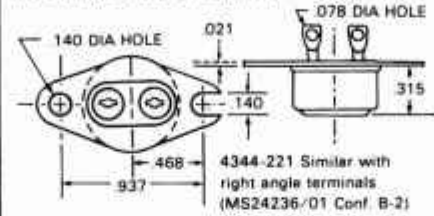
4344-13 (MS24236/01) Conf. A-3)



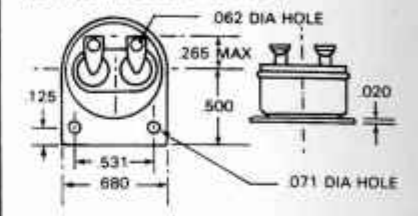
4344-32 (MS24236/01 Conf. B)



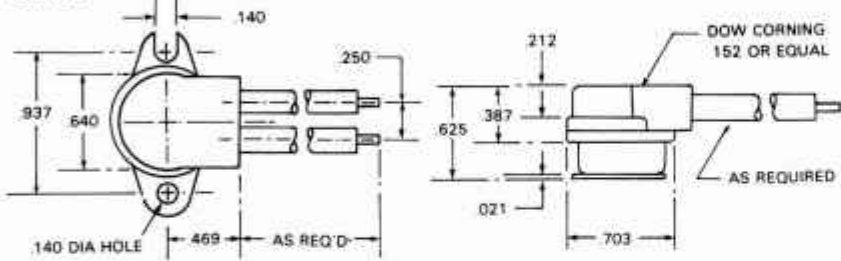
4344-145 (MS24236/01 Conf. A-2)



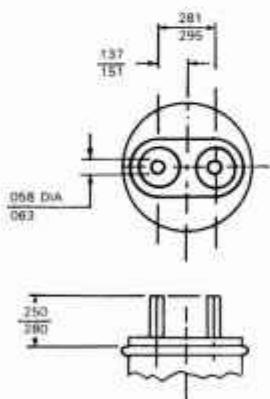
4344-121 (MS24236 01 Conf. B-3)



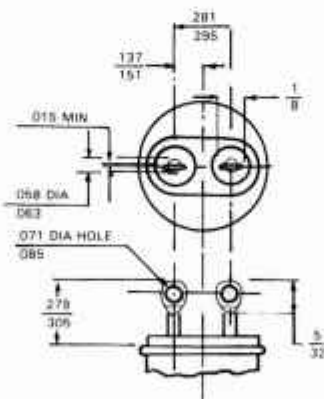
4344-176



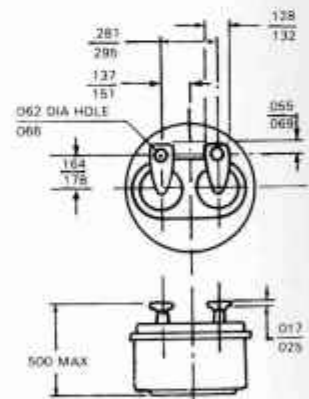
CONSTRUCTION
 A snap acting, bimetal disc serves as the actuating element. As the temperature reaches a predetermined calibration point, the disc snaps to its reverse curvature producing the crisp, positive switching action. This feature assures reliable, consistent operating temperature over long periods of time.



STRAIGHT PIN TERMINALS

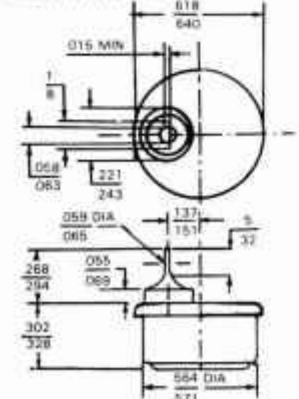


FLATTENED AND PIERCED TERMINALS

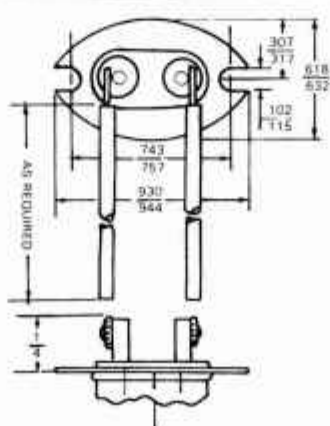


This construction solder sealed

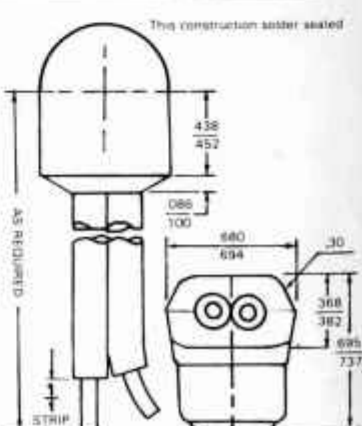
This construction solder sealed



FLATTENED AND PIERCED TERMINAL (ROTATED)



WIRE LEADS



OVERMOLDED



Leads without overmould

The C4344 Thermostat can be supplied with wire leads welded to straight pin type terminals. Leads are No. 18 A.W.G. with insulation and lead length as required.

with overmould

Leads are insulated with silicone rubber overmould. They are No. 18 A.W.G. wire. Lead length is to customer's requirements. Length of lead is measured from the centre of the thermostat to end of wire.

Configuration

The standard thermostat is copper, nickel plated, with silver contacts. Other platings are available, including cadmium and tin. Gold plated contacts can be supplied for low wattage conditions. The more common mounting configurations are shown. Many other varieties are available. Leads can be welded to pin type terminals to form an integral unit. The switch can be custom packaged into a probe, strap mount, or immersion thermostat. A variety of standard mounting brackets are also available.

Weight

Basic unit without overmould

0.2 ozs. (4 grams)

Basic unit with overmould and 12" leads

1.15 ozs. (23 grams)

Terminals

The basic unit can be equipped with either one or two terminals insulated from the thermostat case. Terminals supplied are straight pin, right angle, and flattened and pierced. When single terminals are supplied, the thermostat is internally grounded. Right angle terminals reduce the overall height of the thermostat to 1/2", maximum, from the bottom of the cup.

Temperature settings

Operating Temperatures	NOMINAL DIFFERENTIALS			Opening* Temperature Tolerance °F	Closing* Temperature Tolerance °F	Ambient Temperature Exposure Range
	A Special	B Special	C Nominal			
-65° to 10°F	-	-	30° - 40°	±10	±8	Standard -80°F to 500°F with or without overmould Special without overmould -320°F to +220°F
11° to 200°F	9° - 14°	15° - 19°	20° - 125°	±8	±5	
201° to 300°F	20° - 24°	25° - 29°	30° - 125°	±10	±8	
301° to 350°F	30° - 34°	35° - 39°	40° - 125°	±12	±12	
351° to 450°F	40° - 44°	45° - 49°	50° - 150°	±15	±15	
451° to 500°F	60° - 64°	65° - 69°	70° - 200°	±25	±25	

Performance Characteristics

Dielectric strength (without breakdown or current leakage in excess of one milliampere)	1250 v-ac, rms, 60 cycles for 1 min, terminal to case; 1000 V-ac, rms, 60 cycles for 1 min, terminal to terminal with contacts open; Per MIL-STD-202B, Method 301
Calibration	See temperature settings table
Differential	See temperature settings table
Switch action	SPST, (snap-action)
Ambient temperature range	-80°F to +500°F continuous (non-overmoulded units available for exposure to -320°F when required)
Life cycle	See contact ratings table
Contact resistance	0.015 ohms per MIL-STD-202B, Method 307
Acceleration	60 G
Shock resistance	60 G, 11 milliseconds
Vibration resistance*	5-2000 cps, 20 G per MIL-STD-202B, Method 204A, Condition D
Sand and dust	MIL-STD-202B, Method 110, Test Condition A
Humidity	MIL-STD-202B, Method 103A, Test Condition A
Salt spray	MIL-STD-202B, Method 101A, 168 hrs
Leakage	Immersion test per MIL-E-5272C or MIL-STD-202B, Method 104A, Condition A
Weight (avg)	Basic unit 4.8 gr Basic unit with bracket 5.9 gr Basic unit with overmolds, 12" leads 23 gr

*Devices with Group B or C differentials will withstand these vibration levels without contact bounce or chatter while thermally operated through their switching cycles. (see temperature settings table)



How to Order

Operating samples can generally be specially made and shipped to customers reasonably quickly at a small nominal charge.

Please state both opening and closing temperature with tolerance required, also give details of fixing arrangement, terminals and leads/overmould if required

If for use on low currents (see table front page) specify gold contacts.

Other types of sealed precision thermostats

We also supply other types which are suitable for specialised applications such as crystal ovens, space and defence systems, weaponry and military uses which are similar in size to the series described in this leaflet, but differ in certain details. Further information on request.

SEI

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