

| PHENOLIC MOTOR PROTECTORS

Non-Hermetic Motor Protector for Single-Phase On-Winding Protection

Introduction

Klixon Phenolic Motor Protectors are equipped with a bimetallic snap acting disc, on which the contacts are mounted, and through which the current flows. If overheating conditions occur, the heating effect of the current flow through the Klixon disc and the influence of motor heat will cause the disc temperature to rise.

When the disc reaches the calibrated setpoint, the Klixon protector automatically opens and shuts down the motor, limiting the winding and shell temperature.

When the motor has cooled to an acceptable operating level, allowing the protector to cool to its reset temperature, the Klixon protector resets automatically to a closed contact position allowing the motor to restart.

Manual reset versions are also available for applications where automatic restarting may be hazardous to equipment or operations.



Features

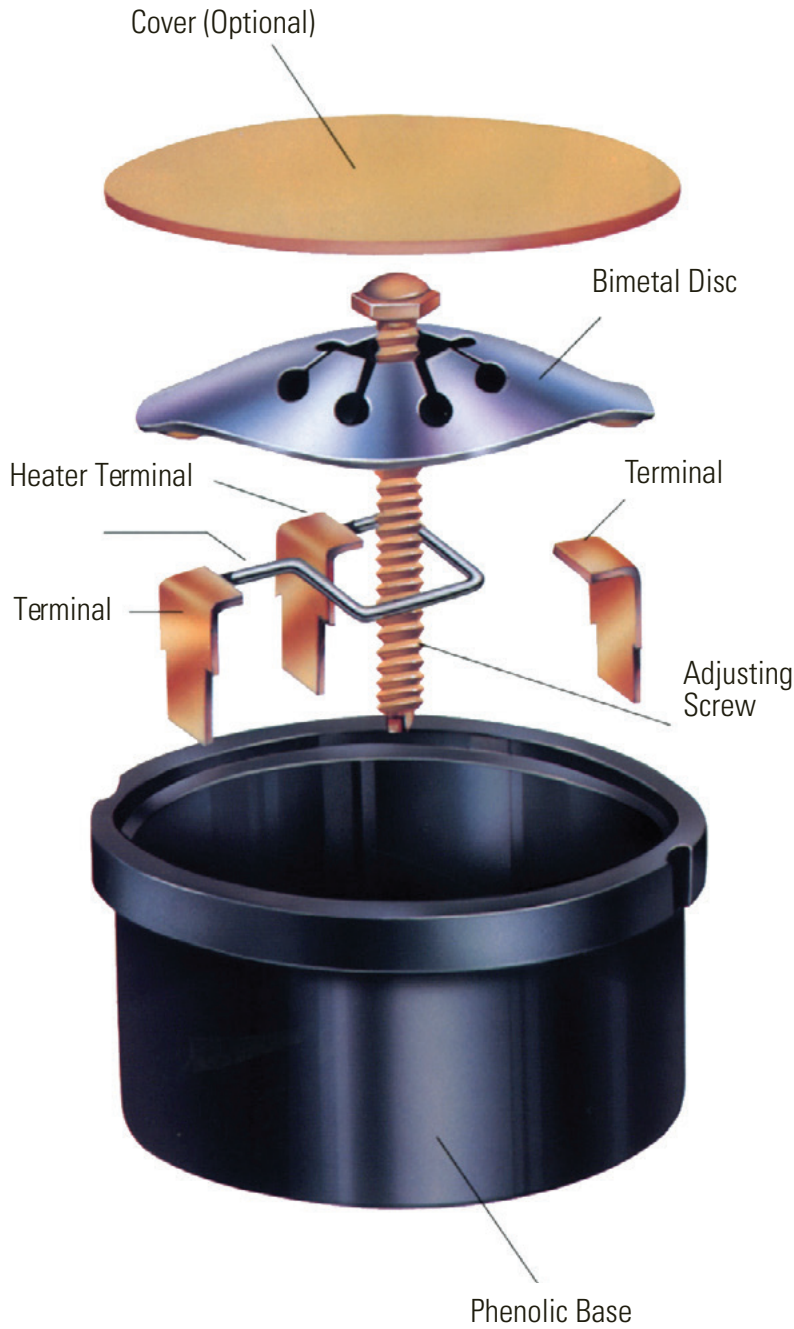
- Normally closed “make or break” Klixon® contact system, which is operated by a snap action disc, is sensitive to both temperature and current.
- Precision calibration – temperature calibrated and inspected under controlled conditions for dependable performance.
- Automatic or manual reset series available
- Easy to install
- VDE certificate with production surveillance, overheating protector. 37 amperes maximum locked rotor 230 VAC, File 4464.4-4510-1013, License No. 3938 UG for 3/4” M.P. only.
- Inherent protection devices for approximately 1/2 to 5 h.p. motors used in applications such as industrial motors, agricultural equipment, well and sump pumps, fans, air conditioners, refrigerators, home appliances, etc.
- When properly applied, protector shuts off motor when temperature exceeds maximum safe level due to an overload or stalled (locked rotor) condition.



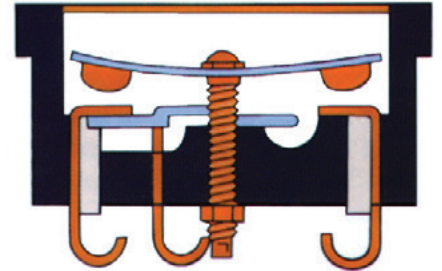
SPECIFICATIONS

Diagrams

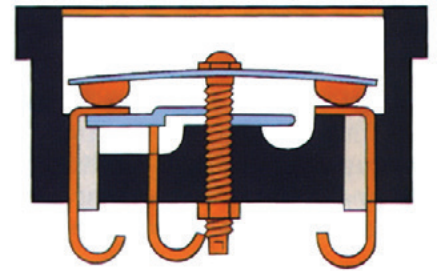
Automatic Reset Exploded View



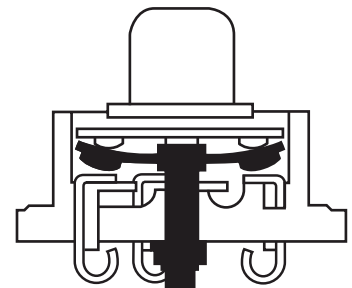
Contacts Open



Contacts Closed

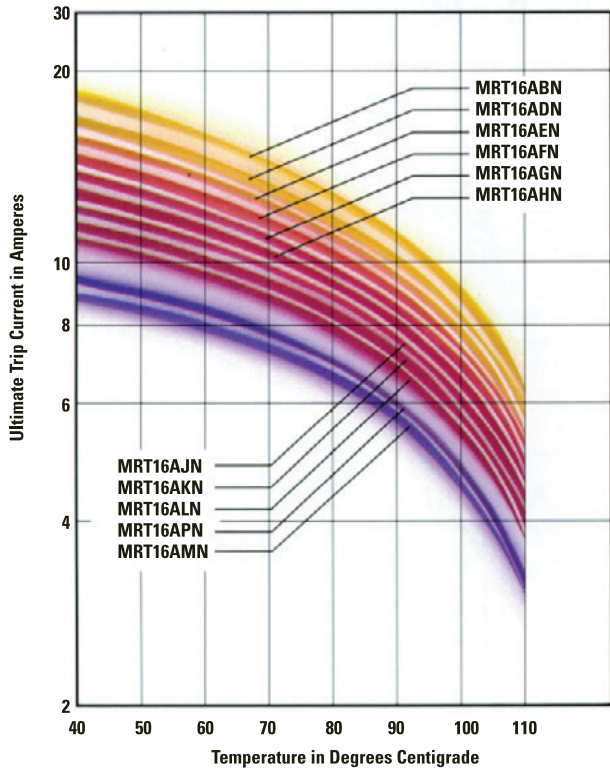


Manual Reset

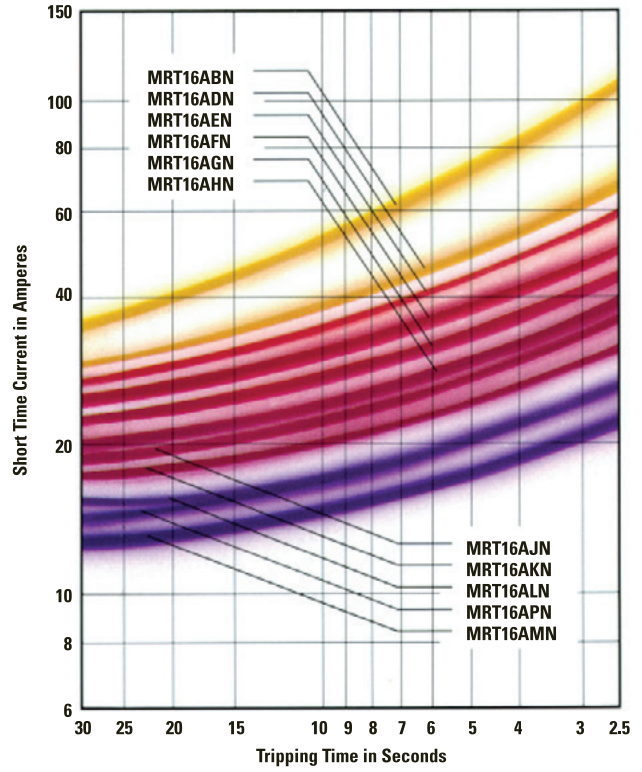


Curves

**Ultimate Trip Current
vs
Protector Ambient Temperature**
(Approximate, to be used only for selecting samples for motor verification test)



**Average first Cycle Tripping Time
vs
Current in 25°C Ambient**
(Approximate, to be used only for selecting samples for motor verification test)



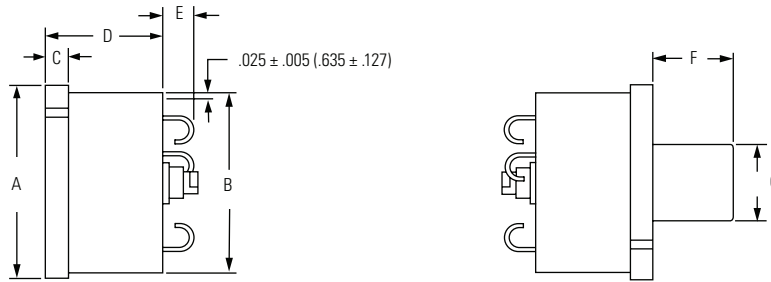
Note: Other ratings available for single and three phase applications.
Computer software is available to assist in application.



DIMENSIONS

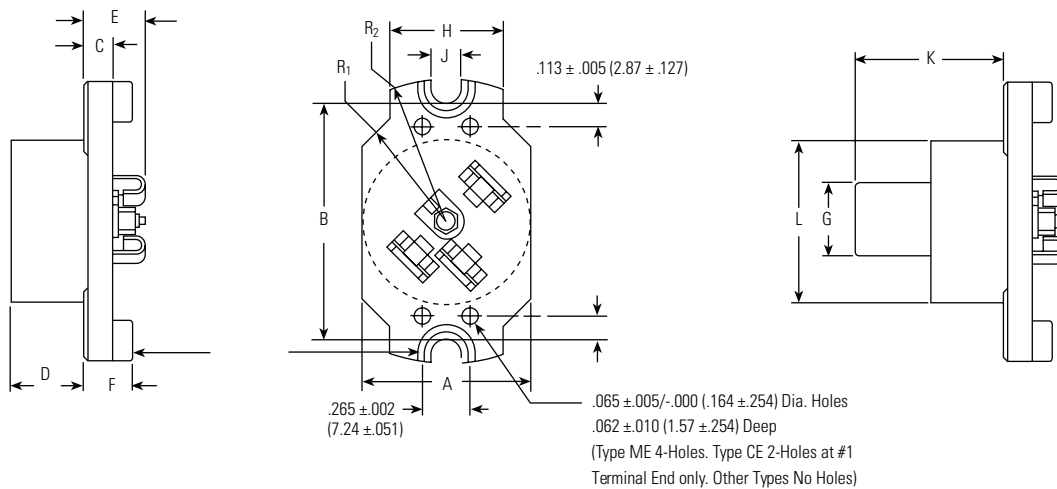
Metric Dimensions in Parentheses

Round Base



| Type | Size | A | B | C | D | E Max. | F | G |
|------|--------|------------------|------------------|-----------------|-----------------|--------|------------------|-----------------|
| MR | 3/4" | 1.031 \pm .010 | .970 \pm .006 | .125 \pm .005 | .625 \pm .010 | .171 | 23/64 \pm 1/32 | .375 \pm .006 |
| CR | 1" | 1.312 \pm .010 | 1.218 \pm .010 | .125 \pm .005 | .640 \pm .010 | .218 | 31/64 \pm 1/32 | .442 \pm .006 |
| BR | 1-1/4" | 1.640 \pm .010 | 1.555 \pm .010 | .156 \pm .010 | .930 \pm .015 | .313 | 27/64 \pm 1/32 | .442 \pm .006 |
| LR | 1-1/2" | 1.983 \pm .010 | 1.881 \pm .010 | .154 \pm .010 | .830 \pm .015 | .375 | 15/32 \pm 3/64 | .781 \pm .006 |

Eared Base

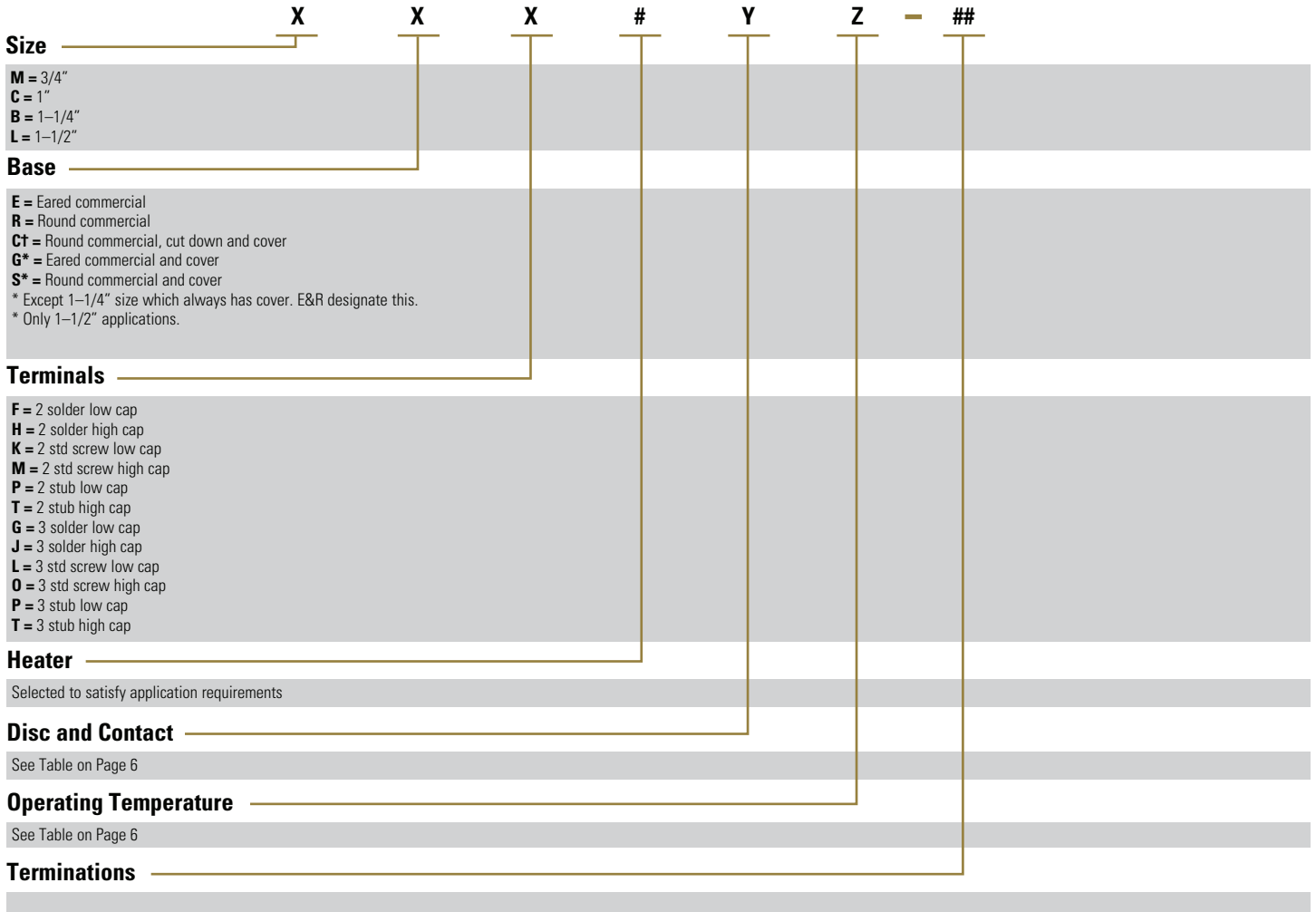


| Type | Size | A | B | C | D | E | F | G | H | J | K | L | R ₁ | R ₂ |
|------|--------|------------------|------------------|-----------------|-----------------|------|-----------------|-----------------|------------------|-----------------|-------|------------------|------------------|------------------|
| ME | 3/4" | .970 \pm .010 | 1.390 \pm .015 | .175 \pm .010 | .450 \pm .015 | .354 | - | .436 \pm .007 | .625 \pm .010 | .176 \pm .010 | .953 | .970 \pm .006 | .656 \pm .010 | .845 \pm .010 |
| CE | 1" | 1.187 \pm .010 | 1.390 \pm .015 | .175 \pm .010 | .464 \pm .015 | .406 | - | .440 \pm .008 | .625 \pm .010 | .176 \pm .010 | 1.000 | 1.187 \pm .010 | .656 \pm .010 | .845 \pm .010 |
| BE | 1-1/4" | 1.594 \pm .010 | 2.125 \pm .010 | .223 \pm .010 | .715 \pm .010 | .552 | .332 \pm .010 | .440 \pm .008 | 1.000 \pm .010 | .218 \pm .010 | 1.180 | 1.552 \pm .010 | .844 \pm .010 | 1.344 \pm .010 |
| LE | 1-1/2" | 1.875 \pm .010 | 2.125 \pm .020 | .267 \pm .010 | .890 \pm .010 | .683 | .517 \pm .010 | .781 \pm .006 | 1.250 \pm .010 | .218 \pm .010 | 1.370 | 1.875 \pm .010 | 1.000 \pm .010 | 1.344 \pm .010 |



ORDERING OPTIONS

Example : M R P 36 A X - 63



Maximum Recommended Protector Contact Ratings

This chart is used to determine protector size needed when making an application.

| Size | Disc Contacts | Terminals | Max. Current V = 120 | Max. Current V = 240 |
|--------|---------------|-----------|-------------------------|-------------------------|
| 3/4" | HC | LC | 32 | 25 |
| 3/4" | HC | HC | 50 | 37 |
| 1" | LC | LC | 40 | 30 |
| 1" | HC | LC | 40 | 30 |
| 1" | LC | HC | 40 | 30 |
| 1" | HC | HC | 80 | 60 |
| 1 1/4" | STD | STD | 135 | 100 |
| 1 1/2" | STD | STD | 175 | 130 |

HC = High Capacity **LC** = Low Capacity **STD** = Standard Capacity
 For reference only. Please contact Sensata for application assistance.

Disc and Contact

| 3/4" | | 1" | |
|----------|----|---------|----------|
| High Cap | | Low Cap | High Cap |
| A | AB | F | C |
| B | AD | G | D |
| C | AE | J | E |
| D | AF | P | H |
| E | AG | L | I |
| | AH | S | K |
| | AI | O | |
| | AJ | T | |
| | AK | AB | |
| J | AL | AE | X |
| | AM | AF | |
| L | AP | AG | |
| | | AH | |
| | | AI | |
| R | | AJ | |
| | | AK | |
| | | AL | |
| | | AM | |
| | | AN | |

Operating Temperature

| Automatic Reset | | |
|--|---------|--------------------------------|
| Open $\pm 5^{\circ}\text{C}$ | | Close $\pm 9^{\circ}\text{C}$ |
| J | = 90 | 57** |
| K | = 105 | 61 |
| L | = 105 | 69 |
| V | = 105 | 78 |
| Z | = 120 | 61 |
| N | = 120 | 69 |
| X | = 120 | 78 |
| Y | = 120 | 92 |
| W | = 135 | 61 |
| U | = 135 | 69 |
| M | = 135 | 78 |
| R | = 135 | 92 |
| S | = 135 | 102 |
| H** | = 150** | 78** |
| P** | = 150** | 115** |
| O** | = 150** | 102** |
| Manual Reset | | |
| Open $\pm 5^{\circ}\text{C}$ | | Close $\pm 12^{\circ}\text{C}$ |
| G | = 90 | 54** |
| F | = 105 | 63*** |
| A | = 105 | 74* |
| B | = 120 | 74 |
| D | = 135 | 96 |
| E** | = 150** | 96** |
| * 1-Phase Protectors only. ** Special temperatures. Consult net additions. *** 3-Phase Protectors only. | | |



APPLICATION WORKSHEET

A sample worksheet provides the information needed for a proper application. It is not possible to apply a Klixon protector based on horsepower, amperage, or name plate data only.

Motor Data

A. Locked Rotor Requirements

1. Locked Rotor Current Cold: the current which exists the instant the motor is turned on.
2. Locked Rotor Current Hot: The current level that exists at end of 1st cycle test. Typically 10 to 30 seconds after motor is first turned on.
3. Time elapsed during above test to raise motor winding temperature from room temperature to around maximum allowed temperature for the UL class of motor insulation. An example would be, for a class A motor, 25°C to 175°C in 12.5 seconds.
4. Ambient Temperature During test: Room temperature (usually 25°C).

B. Running Overload Requirements

1. Load Current: With the motor running, the load on the motor is to be increased in small increments until the motor winding has completely stabilized at approximately 10°C below the maximum allowed by the UL class of the motor. An example would be, for a class A motor, the maximum allowed is 140°C. The motor winding temperature was completely stabilized at 130°C and the current draw at that time would be recorded.
- 2&3. Protector Location Temperatures: These temperatures are taken at the conclusion of the above load current test while the motor is running under the above load.
4. Ambient Temperature: Room temperature (usually 25°C).

C. Abnormal Conditions for Protection.

1. Max/min Ambient Temperatures: temperature in the surroundings of protector.
2. Max/min Line Volts: The highest and lowest voltages for which protection should be effective.
3. Other environmental considerations: i.e., exposed to agricultural weather conditions.

Name Plate Data

- A. Horsepower
- B. Voltage
- C. Single or three phase
- D. FLA (full load amps)
- E. LRA (locked rotor amps)
- F. Insulation class (UL/CSA) (indicate one)

| | |
|-------|--------------|
| _____ | H.P |
| _____ | Volts |
| _____ | Phase |
| _____ | Amps |
| _____ | Amps |
| _____ | ABFH |

Protector Requirements

- A. Automatic or manual reset
- B. Round or eared base
- C. Termination type

| |
|-------|
| _____ |
| _____ |
| _____ |

Motor Data Required

- A. Locked rotor requirements
 1. Locked rotor current cold
 2. Locked rotor current hot
 3. Time required to raise motor winding to max. temperature
 4. Ambient temperature during test
- B. Running overload requirements
 1. Load current required to stabilize main winding temp. at 10°C below maximum allowed
 2. Protector location temperature below protector surface
 3. Protector location temperature above protector (air temp)
 4. Ambient temp during test
- C. Abnormal conditions for protection
 1. Max/min ambient temperatures
 2. Max/min line volts
 3. Other environmental considerations

| | |
|-------|--------------|
| _____ | Amps |
| _____ | Amps |
| _____ | Sec |
| _____ | Deg |
| _____ | Amps |
| _____ | Deg |
| _____ | Deg |
| _____ | Deg |
| _____ | Deg |
| _____ | Volts |
| _____ | Volts |

Note: Application assistance available from Sensata.

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