# Sensata

# **PHENOLIC MOTOR PROTECTORS**

Hermetically Sealed 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.



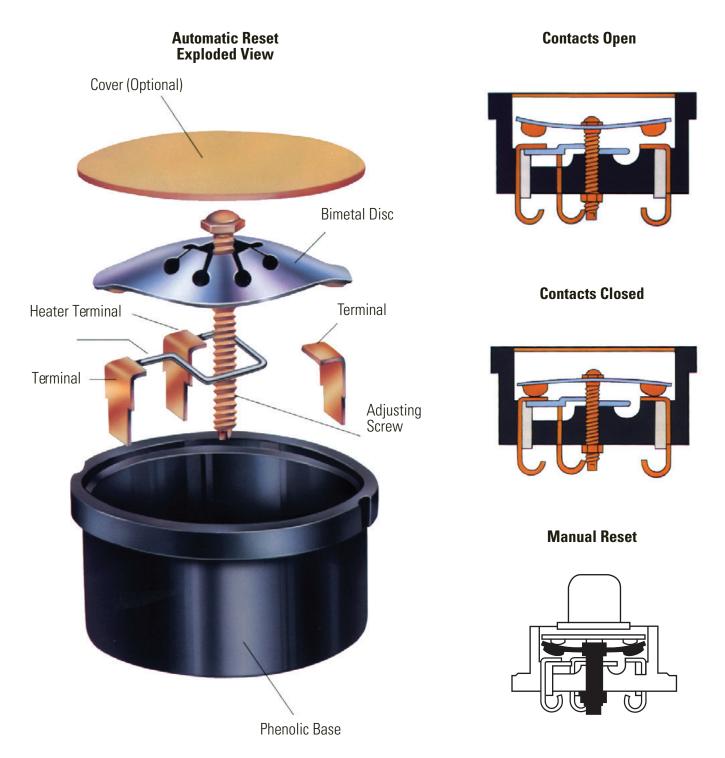
## Features

- 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.

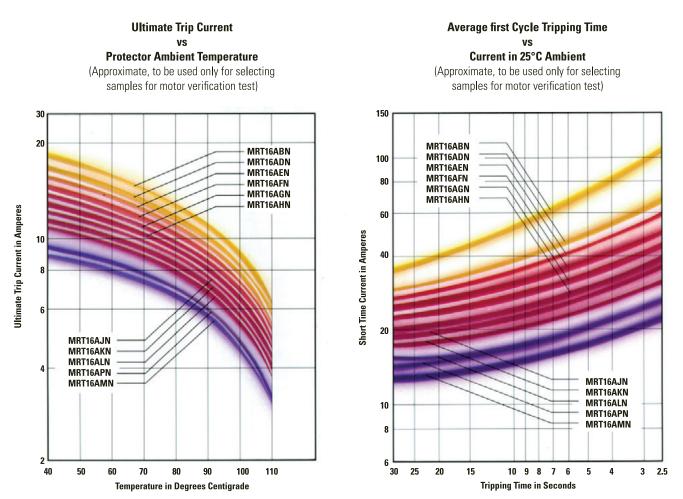


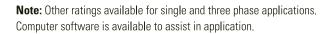










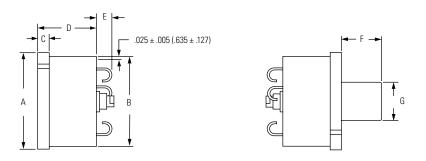




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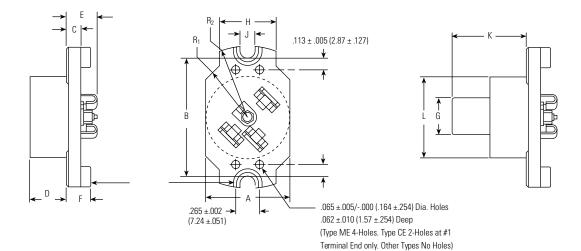


#### **Round Base**



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

#### **Eared Base**



Туре	Size	A	В	C	D	E	F	G	Н	J	К	L	R <sub>1</sub>	R <sub>2</sub>
ME	3/4″	.970 ±.010	1.390 ±.015	.175 ±.010	.450 ±.015	.354	-	.436 ±.007	.625 ±.010	.176 ±.010	.953	.970 ±.006	.656 ±.010	.845 ±.010
CE	1″	1.187 ±.010	1.390 ±.015	.175 ±.010	.464 ±.015	.406	-	.440 ±.008	.625 ±.010	.176 ±.010	1.000	1.187 ±.010	.656 ±.010	.845 ±.010
BE	1-1/4″	1.594 ±.010	2.125 ±.010	.223 ±.010	.715 ±.010	.552	.332 ±010	.440 ±.008	1.000 ±.010	.218 ±.010	1.180	1.552 ± .010	.844 ±.010	1.344 ±.010
LE	1-1/2"	1.875 ±.010	2.125 ±.020	.267 ±.010	.890 ±.010	.683	.517 ±.010	.781 ±.006	1.250 ±.010	.218 ±.010	1.370	1.875 ± .010	1.000 ±.010	1.344 ±.010



Page 4



Size          Size       Image: Size in the second constraint of the second consecond consecond conseconstraint of the second constraint of		Х	Х	Х	#	Y	Z — ##		
C = 1 <sup>-1</sup> Ba: -1-1/2'   Ba:	Size		T				$\top$ $\top$	•	
E = Eared commercial R = Round commercial C + Round commercial and cover S = Saider high cap S = Saider h	<b>C</b> = 1" <b>B</b> = 1-1/4"								
R = Round commercial of down and cover G* = Earde commercial and cover S* = Round commercial and cover Second I - 1/2" applications. Second I - 1/2" - 1/2" applications. Second I - 1/2" - 1/2" applications. Second I - 1/2" - 1/2	Base								
F = 2 solder low cap   H = 2 solder high cap   K = 2 std screw low cap   M = 2 std screw high cap   P = 2 stub low cap   J = 3 solder high cap   G = 3 solder low cap   J = 3 stub low cap <	R = Round commercial Ct = Round commercial, cut do G* = Eared commercial and co S* = Round commercial and co * Except 1–1/4" size which alv	ver over	gnate this.						
H = 2 solder high cap   K = 2 std screw low cap   M = 2 std screw low cap   P = 2 stub low cap   T = 2 stub high cap   G = 3 solder high cap   J = 3 stoler kigh cap   J = 3 stoler kigh cap   T = 3 stub high cap   F = 3 stub high cap   F = 3 stub high cap   Selected to satisfy application requirements   Disc and Contact   See Table on Page 6     See Table on Page 6	Terminals								
Selected to satisfy application requirements Image: Contact in the sector of the									
Disc and Contact   See Table on Page 6   Operating Temperature   See Table on Page 6	Heater								
See Table on Page 6 Operating Temperature See Table on Page 6	Selected to satisfy application	requirements							
Operating Temperature       See Table on Page 6	Disc and Contact —								
See Table on Page 6	See Table on Page 6								
	<b>Operating Temperat</b>	ure ———							
Terminations	See Table on Page 6								
	Terminations ——								

# 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			
11/4″	STD	STD	135	100			
11/2″	STD	STD	175	130			
<b>HC</b> = High Capacity <b>LC</b> = Low Capacity <b>STD</b> = Standard Capacity For reference only. Please contact Sensata for application assistance.							



#### **Disc and Contact**

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

# **Operating Temperature**

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





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 pc. 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	H.P
B. Voltage	Volts
C. Single or three phase	Phase
D. FLA (full load amps)	Amps
E. LRA (locked rotor amps)	Amps
F. Insulation class (UL/CSA) (indicate one)	ABFH

#### **Protector Requirements**

A. Automatic or manual reset	
B. Round or eared base	
<b>C.</b> Termination type	

#### **Motor Data Required**

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

Note: Application assistance available from Sensata.

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Mailing Address: Sensata Technologies, Inc., 529 Pleasant Street, Attleboro, MA 02703, USA

#### **CONTACT US**

#### Americas

+1 508 236 2551 electrical-protection-sales@ sensata.com

#### Europe, Middle East & Africa

+3 174 357 8156 info-sse@list.sensata.com Asia Pacific EP Asia Public@list.sensa-China +86 (21)2306 1651 India +91 (40)4033 9611 Japan +81 (45)277 7104 Korea +82 (53) 644 9685 Rest of Asia +65(6478)6860