

## KLIXON | 4TM SERIES COMPRESSOR CONTROL

### Motor Protector for Refrigeration Compressors

#### PRODUCT OVERVIEW

- Plug-on thermal motor protector for compressors
- Protects compressors for refrigerators, freezers, dehumidifiers, water coolers, vending machines, and similar refrigeration applications
- Compatible with PTCR starters and electro-mechanical relays
- Product designed and manufactured in an environment of Total Quality Control
- Applicable to compressors manufactured around the world
- Conforms with worldwide certification agency standards

#### Benefits

##### Cost

The 4TM's plug-on feature and our fully automated manufacturing module provide 4TM customers with lower total installed cost.

##### Quality

Sensata has designed quality into the 4TM product and process to meet a quality standard based on Statistical Process Control techniques.

##### Performance

The basic function of the 4TM is to protect the motor in a refrigeration compressor from overheating, resulting from locked rotor or running overload conditions. The 4TM provides this protection by sensing the current and temperature of the motor. The fundamental actuation principle incorporates a noncurrent carrying snap-acting disc, which is located above the heater element. (REFER TO BACK PAGE FOR REFERENCE DRAWINGS). In addition to radiant heat generated from the heater, compressor shell, and ambient, the disc senses the heat from the metal pin carrying line current through the hermetic terminals.

When the disc snaps, it actuates the spring arm located above the disc, opening the contact circuit which shuts off the compressor motor. The operating parameters of the 4TM are not affected by contact wear because the contacts are not part of the resistance circuit and are not part of the temperature calibration

mechanism. The design features of the 4TM performance and reliability are the following:

- The variability to increase off-times allows for matching and compatibility with PTCR starters
- Repeatability of trip time and ultimate trip
- Reduced temperature drift over life cycles
- Resistance to physical and thermal shock

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## Motor Protector for Refrigeration Compressors

Part Number 4TM 330 KFB YY - 53

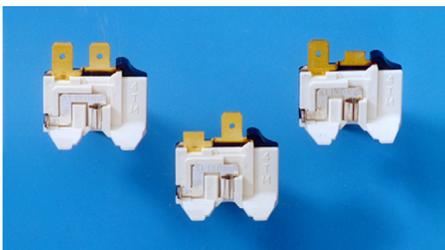
Basic Name for Thermal Motor Protector

Three Digit Heater Code  
Coil - 100 thru 499  
Flat - 700 thru 899

Three letter Code  
Designates Disc, Operating Temperatures, and Tolerance  
1st Letter - Opening Temperature  
2nd Letter - Closing Temperature  
3rd Letter - Tolerance

Denotes Contact Capacity  
1st Letter Indicates Stationary Contact  
2nd Letter Indicates Movable Arm Contact  
Y - Low Capacity (Rated 20 AMP)  
Z - High Capacity (rated 32 AMP)

External Terminations (Male Quick Connects)



### Contact Capacity (Cycle Life Guidelines)

The 4TM is designed to achieve a minimum of 10,000 cycles as defined by a Weibull analysis of test results. End of useful design life is defined as open or permanently closed circuit, and a change in open temperature of greater than  $\pm 5^{\circ}\text{C}$  or a change in reset temperature of  $\pm 9^{\circ}\text{C}$  from the device's original value.

Test conditions are:

Contact	Operating Voltage
ZZ	120
YY	240

Max Current	Power Factor
32 Amps	65%
20 Amps	65%

These guidelines are intended to direct users toward a proper selection of contact capacity for specific applications and judgment of acceptability of cycle rate on an application relative to their specific goals for cycle life reliability. It presumes that the heater capacity has not been exceeded, and only published

combinations of open and reset temperatures are used.

Estimates of life of a given 4TM rating, in combination with a given compressor, may be obtained from a Sensata Technologies Sales/Marketing representative. It is incumbent upon the user to determine the reliability of the combination by actual locked rotor life test of the system.

### Notes on Code

**Heaters:** Coiled heaters are preferred for PTCR-starter type applications because they provide longest off time; however, their ratio of first cycle trip time amps to ultimate trip amps is greater than flat heaters (approx. 4:1). The coiled heater series can cover a range of U.T.A. at  $71^{\circ}\text{C}$  from 0.7 amps to 5 amps. Flat heaters are preferred for relay type applications due to their narrower ratio of trip time current to ultimate trip current (approx. 3:1) flat heaters can cover a range of U.T.A. at  $71^{\circ}\text{C}$  from 0.9 amps to 8 amps.

**Temperatures:** Below is a list of standard operating temperatures, and each has  $\pm 5^{\circ}\text{C}$  tolerance on open temp and  $\pm 9^{\circ}\text{C}$  tolerance on reset temperature. Consult your local Sensata Sales/ Marketing representative for special requirements.

\*Failure to properly apply the 4TM could result in actuation of the device when the compressor should be operating, or overheating of the motor during a fault condition.

### 4TM Operating Temperatures

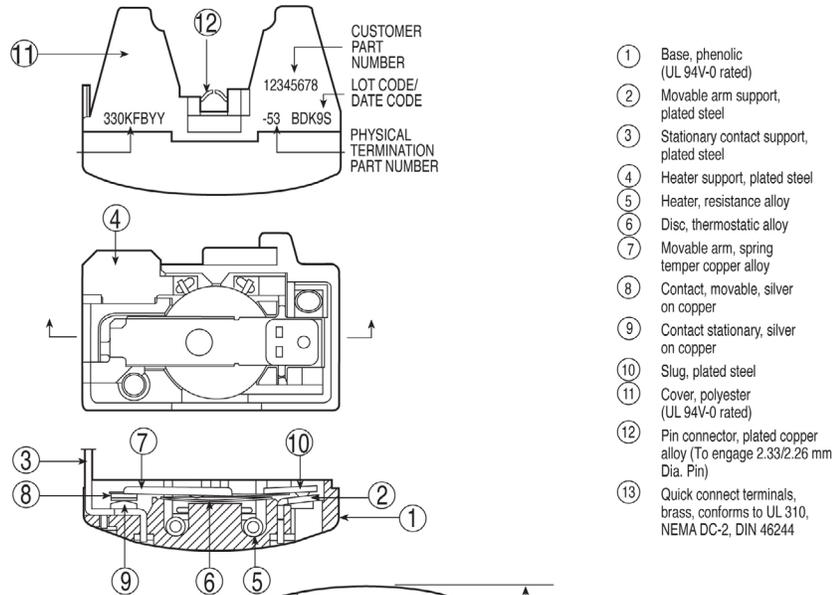
Temperature Code	Nominal Open	Nominal Close
JDB	100.0	52.0
KDB	105.0	52.0
KFB	105.0	61.0
LDB	110.0	52.0
LFB	110.0	61.0
MDB	115.0	52.0
MFb	115.0	61.0
MHB	115.0	69.0
NFB	120.0	61.0
NHB	120.0	69.0
PFB	125.0	61.0
PHB	125.0	69.0
REB	130.0	57.0
RFB	130.0	61.0
RHB	130.0	69.0
RLB	130.0	78.0
SFB	135.0	61.0
SHB	135.0	69.0
SLB	135.0	78.0
TFB	140.0	61.0
THB	140.0	69.0
TLB	140.0	78.0
UFB	145.0	61.0
UHB	145.0	69.0
ULB	145.0	78.0
VFB	150.0	61.0
VHB	150.0	69.0
VLB	150.0	78.0
VPB	150.0	87.0
WHB	155.0	69.0
WLB	155.0	78.0
WPB	155.0	87.0
XHB	160.0	69.0
XLB	160.0	78.0
XPB	160.0	87.0

### Certification Agency Information

- UL/Canadian-UL Component Recognition: File E15962
- KEMA/ENEC Compliance: Certification # 2014531.15
- CQC Certification: 09002034936
- REACH compliant
- RoHS complaint

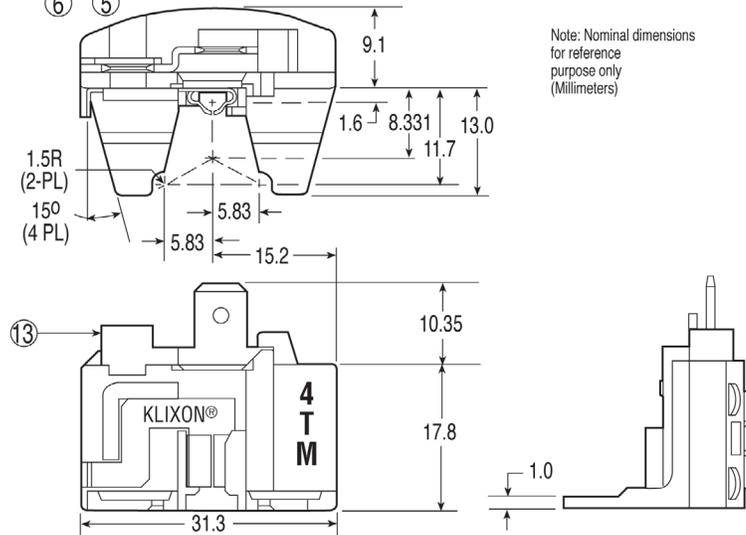
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## Motor Protector for Refrigeration Compressors



Note: Nominal dimensions for reference purpose only (Millimeters)

Conversion Chart	
Inches	mm
.006	0.15
.039	1.0
.059	1.5
.063	1.6
.110	2.8
.150	3.8
.230	5.83
.328	8.3
.390	9.9
.394	10.0
.460	11.7
.512	13.0
.598	15.2
.701	17.8
1.232	31.3



The World Depends on Sensors and Controls

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