



KLIXON®

MOTOR STARTER-PROTECTOR COMBO (MSC) REFRIGERATION PACKAGE

Compact, Reliable, Low Power Consumption

PROVEN TECHNOLOGY

The Klixon® MSC refrigeration package is a compact motor starter and motor protector package that dissipates less than 2 watts under typical operating conditions.



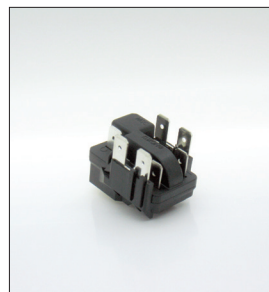
STANDARD



1-PIECE (RSIR)



1-PIECE (RSCR)



TERMINAL BOARD



2-PIECE (RSIR)



2-PIECE (RSCR)

OVERVIEW

The MSC by Sensata Technologies serves as a combination control that:

- Uses compact metal can motor protector and solid state PTC motor starter
- Includes Internal Back-up Protection System for the PTC motor starter
- Available for both RSIR and RSCR applications (*Contact Sensata for alternate configurations*)
- Plugs directly onto compressor terminal pins
- Dissipates less than 2 watts under typical operating conditions

FEATURES

- Applicable to fractional horsepower compressors used in residential refrigerators and freezers, and similar refrigeration applications
- Utilizes ceramic PTC (Positive Temperature Coefficient) thermistor element to energize / de-energize motor start windings
- Available for 120 and 220 volt applications
- Configurations available to suit most residential applications
- Less costly to install than discrete motor starter and protector components

CONFIGURATIONS

- **MSC Standard**

Multiple quick connect (QC) terminal configurations available; designed to be used with secondary compressor relay cover

- **MSC One-Piece Connector**

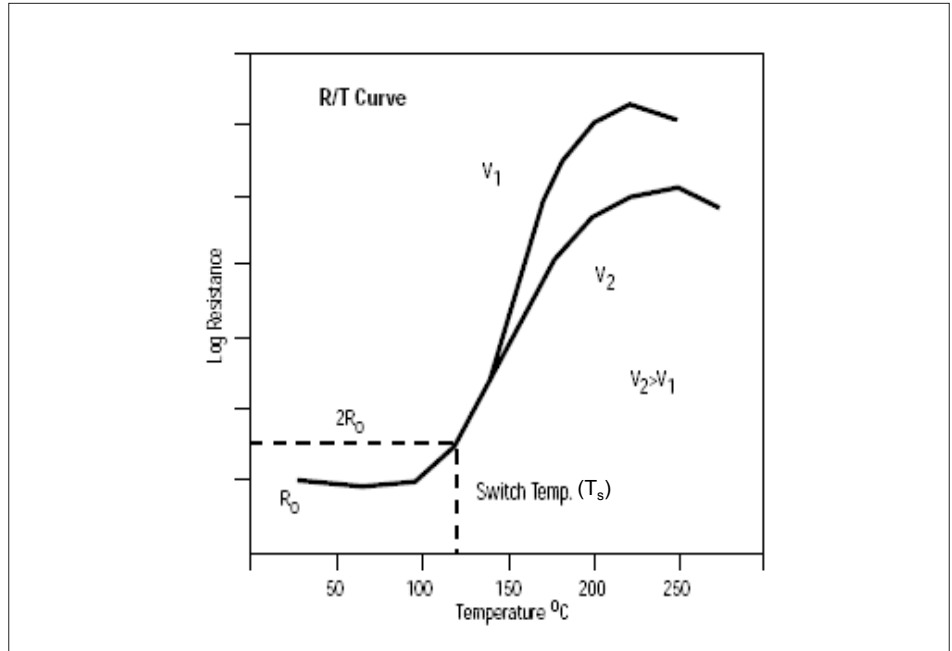
3.2 mm x 0.5 mm terminals for use with standard insulated connector; available for use with or without direct-mounted run capacitor

- **MSC Two-Piece Connector**

1/4" and/or 3/16" QC terminal configurations for use with standard insulated connectors; available for use with or without direct-mounted run capacitor

- **MSC Terminal Board**

Multiple QC and screw terminal configurations available; designed to be used with secondary compressor relay cover



GLOSSARY

R₀ Measured resistance value at 25°C at maximum of 2.0 volts

Switch Time (t_s) Time required for the inrush current to decrease to 1/2 of its initial value

Switch (Curie) Temp. (T_s) Temperature at which the PTC resistance value is 2X the 25C value (R₀)

Reset Time Time required for the PTC resistance to return to 2X the initial value (2R₀)

V_{max} Maximum operating voltage that may be applied across the PTC

V_r Nominal rated supplied voltage: 120 or 240 VAC (<V_{max})

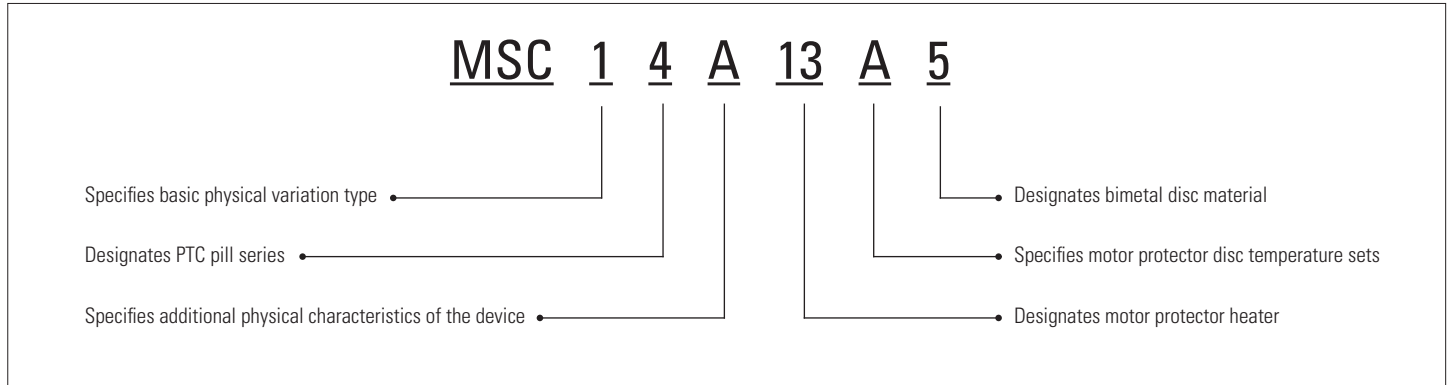
I_{ss} Steady state current remaining at maximum operating voltage

I_{max} Maximum operating (inrush) current

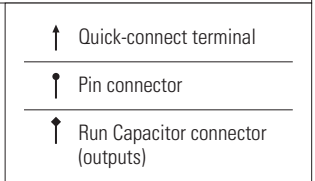
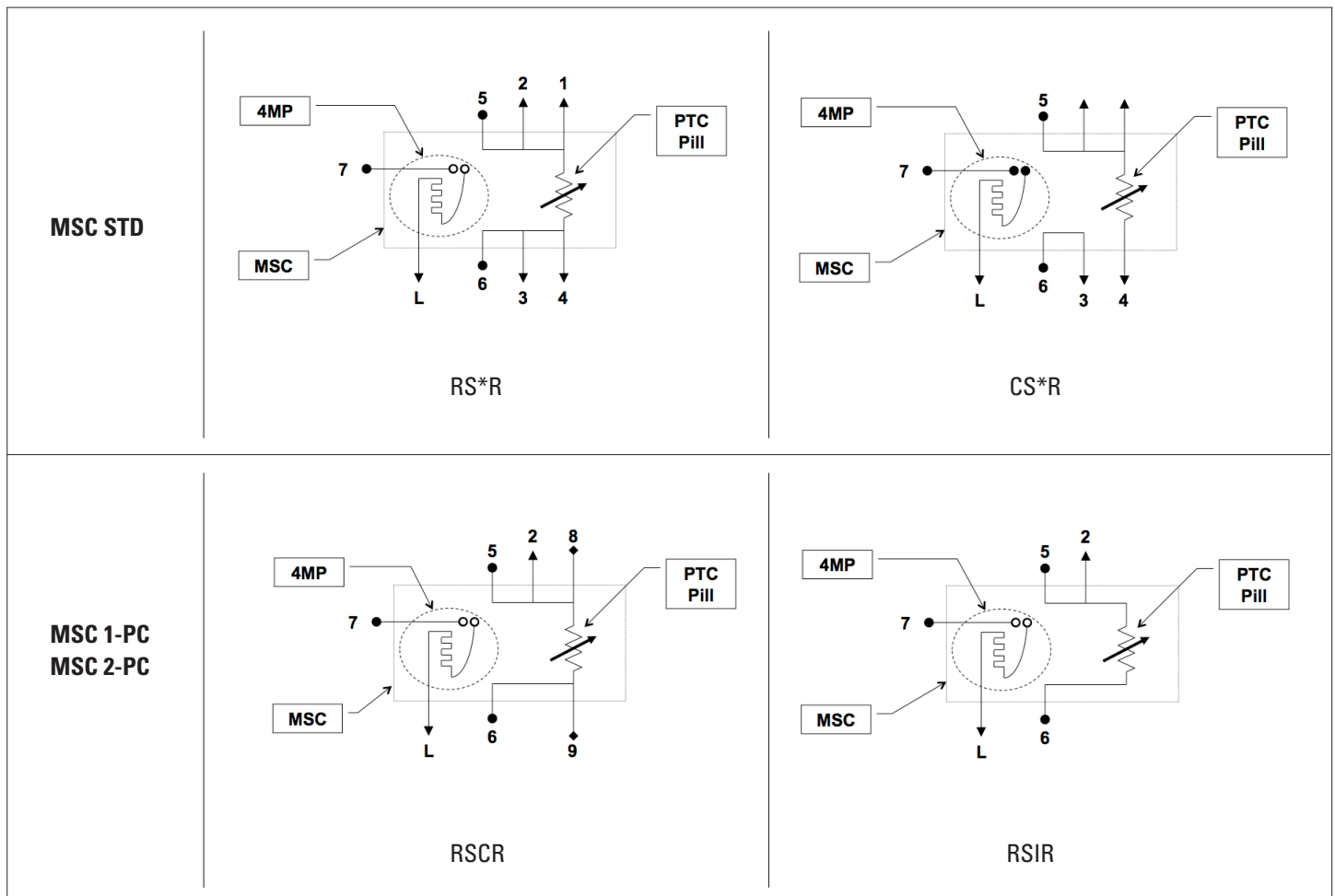
APPLICATION NOTES

1. The surface and terminals of the MSC device can reach high temperatures under typical running conditions. Any material in contact with the MSC and its terminals, including wire and quick-connect receptacle plastic insulation, should have a minimum temperature rating (UL RTI) of 105°C. Adequate spacing should be provided to insulate lower-rated materials from this heat source.
2. The MSC device should be protected from potential sources of liquid, such as the evaporator tray and water connections.
3. Certain materials, such as chlorine (Cl) containing gases, can degrade the characteristics of the MSC device. The MSC device should not be exposed to sulphur (S) or chlorine (Cl) containing gases, and must be kept away from materials that can generate them. In particular, avoid the use of polyvinyl chloride (PVC) insulation in contact with the MSC terminals.
4. The MSC device should not be exposed to hydrocarbon based materials, as they can cause a degradation in the PTC characteristics.
5. The final device configuration selection will determine the necessity for a secondary compressor relay cover and or supplemental retention requirements.
6. The installation force applied to the MSC device must be in parallel with the compressor feedthrough pins and must not exceed 20 kgf (44 lbs).

PART NUMBERING SYSTEM



ELECTRICAL SCHEMATICS



SPECIFICATIONS

GENERAL

Temperature Limits	Ambient Air: 0°C to 70°C
Electrical Requirements	120 or 240 VAC nominal voltage (50 or 60 Hz)

MOTOR STARTER

Room Temperature Resistance

3.9Ω to 47Ω ratings available
±25% resistance tolerance

Switch Time

0.1 – 1.4s at 120 or 240 VAC

Reliability

500,000 cycles at maximum rated conditions of voltage and current

MOTOR PROTECTOR

Device Actuation Temperatures

Open Temperature: 100°C to 160°C ± 5°C
Close Temperature: 55°C to 70°C ± 9°C
Temperature Differential: 60°C typical

Rated Hot Locked Rotor Current

120 VAC: 18.0 A maximum
240 VAC: 10.0 A maximum
60% power factor

Ultimate Trip Current

0.5 – 5.5 A @ 71°C

Endurance¹

Minimum of 15,000 cycles at maximum rated current at 120 and 240 volts, as predicted by Weibull analysis of the test data. This protection must be verified in the end application.

¹ A failure is defined as an open circuit or permanently closed circuit, rapid cycle (>3X normal rate), or by a change in the open or close temperature of more than 10% from the original values.

AGENCY CERTIFICATIONS

UL/Canadian–UL Component Recognition: File SA3745
KEMA/ENEC Compliance:
Certification # 2014531.01
IEC/EN 60730-2-4: 2007
IEC/EN 60730-2-10: 2007
IEC/EN 60079-15: 2005
IEC/EN 60335-1: 2001, clause 30.2.3
CQC Certification: 08002025660
RoHS compliant

Sensata Technologies, Inc.

529 Pleasant Street
Attleboro, MA 02703-2964
U.S.A.
Phone: 1-508-236-3800

Sensata Technologies Sensores e Controles do Brazil Ltda.

Rue Azarias de Melo
#648 – Taquaral Campinas – SP
Brasil
CEP 13076008
Phone: +55-19-3754-1111

Sensata Technologies Holland B.V.

Kolthofsingel 8
P.O. Box 43, MS 4220
7600 AA Almelo
The Netherlands
Phone: +31-546-87-95-60

Sensata Technologies China Co., Ltd. *BM International*

Business Center 30th Floor
100 Yu Tong Road
Shanghai 200070
People's Republic of China
Phone: +86-212-2306-1500

Sensata Technologies Japan Ltd.

305, Tanagashira Oyama-cho,
Sunto-gun, Shizuoka-ken
Japan, 410-1396
Phone: +81-550-78-1211

Sensata Technologies Korea Ltd.

29F, Trade Tower
159-1 SamSung-Dong
KangNamKu
Seoul 135-729
South Korea
Phone: +82-2-551-2904

sensata.com



The World Depends on Sensors and Controls

©2011 Sensata Technologies, Inc. All rights reserved worldwide. Printed in U.S.A. Revised March 2011.

Important Notice: Sensata Technologies reserves the right to make changes to, or to discontinue, any product or service identified in this publication without notice. Before placing orders, users should obtain the latest version of the relevant information to verify that the information being relied upon is current.

Sensata Technologies assumes no responsibility for customers' product designs or applications. Users must determine the suitability of the Sensata device described in this publication for their application, including the level of

reliability required. Many factors beyond Sensata's control can affect the use and performance of a Sensata product in a particular application, including the conditions under which the product is used and the time and environmental conditions in which the product is expected to perform. As these factors are uniquely within the user's knowledge and control, it is essential that the user evaluate the Sensata product to determine whether it is fit for a particular purpose and suitable for the user's application.

Sensata Technologies products are sold subject to Sensata's Terms and Conditions of Sale which can be found at www.sensata.com/terms.htm